FLIGHT and AIRCRAFT ENGINEER

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FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams : Flightpres, Sedist, London. Telephone : Waterloo 3333 (60 lines.)

COVENTRY: 8-10, CORPORATION ST. Telegrams: Autocar, Coventry. Telephone: Coventry 5210.
BIRMINGHAM, 2: KING EDWARD HOUSE, NEW STREET. Telegrams: Autopress, Birmingham. Telephone: Midland 7191 (7 lines).
MANCHESTER, 3: 260, DEANSGATE. Telegrams: Iliffe, Manchester. Telephone: Blackfriars 4412 (3 lines) Deansgate 3595 (2 lines)
GLASGOW, C.2: 26B, RENFIELD ST. Telegrams: Iliffe, Glasgow. Telephone: Central 4857

SUBSCRIPTION RATES: Home and Abroad: Year, £3 1 0. 6 months, £1 10 6.

No. 2077. Vol. LIV October 14th, 1948 Thursdays, One Shilling

# The Outlook

## Preparations for Preparedness

"AT present the frontier of Asia is upon the Elbe, but we should be very foolish to allow all that is taking place before our eyes, and dinned into our ears every morning, to have no effect upon our minds." No one but Mr. Churchill could have pinpointed so accurately in so few words the grim realities of the present situation. And if any emphasis were needed concerning the importance of the Western Allies not allowing themselves to be driven out of Berlin, it was supplied by his reminder that from the Rhine it is quite possible to carry a stream of the new V-weapons to the southern part of England.

Let any who honestly believe, if such there still be, that we need not take our rearmament too seriously, realize that in these days of power politics, the fate of the impotent is tragic indeed, as Lord Tedder so truly said the other day in his address to the Headmasters' Conference at Oxford. Weakness is an invitation to attack, not merely physical weakness but even more so moral weakness. Fortunately, the nation as a whole realizes this fact fairly clearly, no one more so than the small section which would welcome the spreading of the Communist flood to their own country. Or at least, so they fondly believe; they would probably change their minds when they discovered by bitter experience the difference between theory and stark reality.

Mr. Churchill spoke even more forthrightly at the Conservative Conference at Llandudno than he had previously at the opening of the Croydon headquarters of No. 615 (County of Surrey Squadron of the Royal Auxiliary Air Force. Few would disagree with him when he said that "if it were not for the stocks of atomic bombs now in the trusteeship of the United States, there would be no means of stopping the subjugation of Western Europe by Communist machinations backed by Russian armies and enforced by political police."

The great recruiting campaign now going on is having a good measure of success. The fact that the views of the Government are shared by the other Parties has served to convince the nation that here we are face to face with something which far transcends in importance the interests of individuals and groups, but it is doubtful that there is as yet a full realization of the urgency of the matter. For that reason it is rather regrettable that some spokesmen have stated that the measures being taken are not panic measures. The same sort of statements were made in the years before the 1939-45 war, when, as it turned out, there was less cause for panic in that a certain breathing space was granted us. Should it unhappily come to war once more, there will be no such months of grace before the full fury falls upon us. We are not, of course, advocating panic preparations in the sense of actions taken without thought or plan, as a flock of sheep running hither and thither. But we do suggest that panic used in the sense of extreme urgency is a not inappropriate word.

Apart from the recruiting campaign and the speeding-up of armament production at home, the appointment by the Governments of the Brussels Treaty Powers of officers to head the land, naval and air commands is a welcome sign that progress is being made in the ordered planning of defence in the West. That a Royal Air Force officer should be appointed C.-in-C., Air Forces, Western Command, was but logical in view of the fact that the French Air Force is small and, for the time being, somewhat inadequately equipped. That the choice has fallen upon Air Marshal Sir James Robb is to be welcomed. He acted as deputy to Lord Tedder in North Africa and Normandy, and after the war, before his appointment to the post of Vice-Chief of the Air Staff, he was A.O.C.-in-C., Fighter Command. Sir James will have on his staff high-ranking officers of the Benelux countries and France, thus ensuring the very closest collaboration in the air matters of the Western Powers.

## British Jets Abroad

ONE of the most important and lucrative items on our export list is military aircraft, and it is gratifying from every point of view to see more and more countries, particularly those within the Western European defence alliance, equipping their fighter squadrons with English jet fighters.

During the last week, American opinion has questioned the wisdom of supplying additional Vampires to Sweden when more closely allied countries are in need of them. The criticism is pertinent, and the British reply, although it has been accepted, does not make out a very convincing case. While recognizing Sweden's delicate position, and without knowing the details of agreement under which jet aircraft might be supplied to avowedly neutral countries, it would seem that other countries have a claim to priority. In the event of hostilities there is little reason to suppose that Swedish aircraft would fall into enemy hands. He that is not with us is not necessarily against us, as was proved in the recent war. Nevertheless, it would be a great deal better to know that a group of more than a hundred jet fighters were actively engaged in our support, or would be made available to those prepared to use them on our side.

Excellent aircraft though it is, the Vampire, by virtue of its modest performance, judged by contemporary jet standards, is now retiring towards the operational trainer category. It is more than 100 m.p.h. slower than the best fighters now flying in this country and in America, and there would not now be much for an enemy country to learn from a captured example.

In America many people remember the sale—Government-sponsored, by all reports—of a number of Rolls-Royce Nenes to Russia, and the American protest regarding Vampires is probably of a precautionary nature.

The re-equipment of European Allies with our latest material introduces most involved considerations. It might be held, for instance, that the building of Meteors under licence in Holland is unwise, in case an enemy with inferior equipment were to capture and make use of both aircraft and factory. Our knowledge of military aircraft and their power units is, however, at least two years ahead of that built into the aircraft now in Squadron service. Moreover, we have the all-important background knowledge and experience which cannot be obtained by any sort of short cut.

In emergency the fighters at present equipping our own and a few Allied squadrons in Europe would almost certainly be superseded in a matter of months. What we must avoid is unintentionally or accidentally handing out any advanced basic information which, when added to their existing knowledge, might be used by an enemy.

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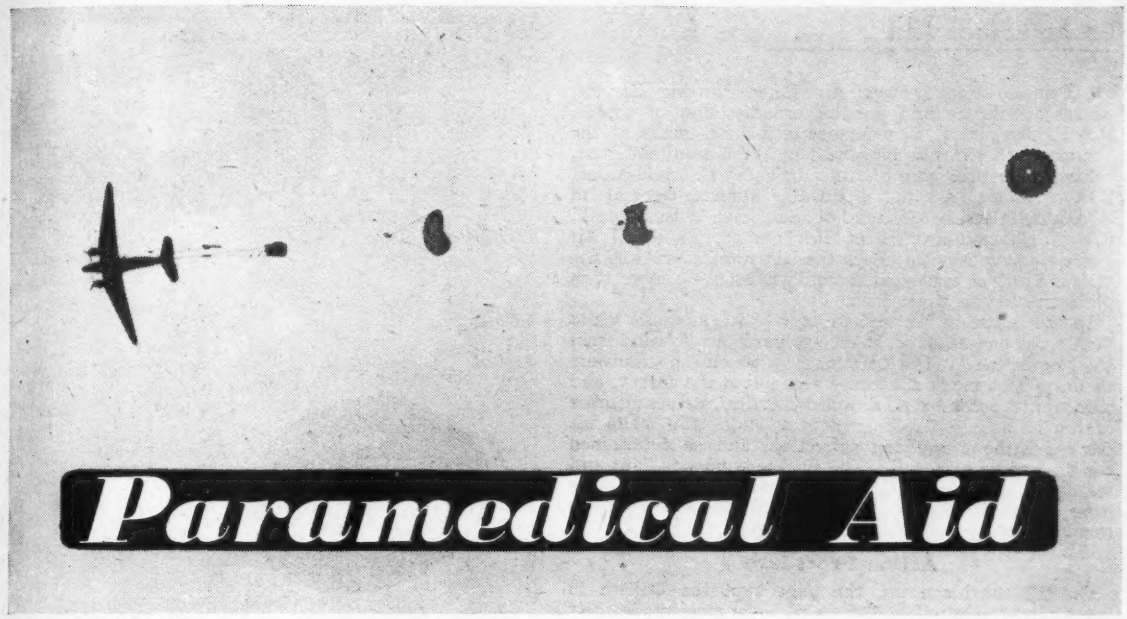
*Forthcoming Events, page 471*

*THROUGH THE OVERCAST: Against this picturesque background, the Newbury Eon is an outstandingly attractive aircraft. All-round performance of the model with the Gipsy Major engine came up to expectations, but Elliotts of Newbury, Ltd., the manufacturers, are not proceeding with production since the support for private flying in this country is so poor, for obvious reasons, and since there is such difficulty in arranging finances overseas. A new Gipsy-engined prototype was planned having a longer fuselage to counter-balance the larger engine, and with a new cockpit hood to give a better view to the rear.*



# Paramedical Aid

"Flight" photograph.

*SIC TRANSIT: On the way down from the Dakota are the Doctor, followed by two nursing orderlies, followed in turn by two nursing sisters, the last of whom can be seen just leaving the aircraft.*

## *Institution of R.A.F. Parachute Medical Teams*

IT is a sentimental convention for those who are suffering to regard nurses as ministering angels and, with the recent inauguration of parachute medical teams in the Royal Air Force, it may well be that some survivors of crashes in inaccessible places will henceforth see the "angels" who have come to minister to them literally dropping to earth—not, of course, on the snow-white wings of the medieval painters, but beneath the khaki nylon canopies of statichutes.

At the R.A.F. Parachute and Glider Training School, Upper Heyford, the first of the parachute medical teams are now coming to the end of their training. We were recently able to witness a demonstration of the way the teams will operate, and a remarkably convincing display it was.

Certainly, some of the heavier equipment used in the demonstration was not actually dropped at the time—one had to imagine that it had been—and, of course, the "casualties," too, were simulated. Nevertheless, one must recognize that the scheme has just started and that experimentation is still taking place to devise equipment and procedure of the optimum efficiency. But, whilst bearing this in mind, it must also be appreciated that a good job of work has already been done, the personnel concerned are dead keen, the whole concept is a first-class idea, and there is not the slightest reason to doubt that, having now been established, the parachute medical service will rapidly become as highly organized and efficient a section of the Royal Air Force as any other.

Not the least interesting aspect of this new departure is that women are included in the teams, and whilst we hold no brief for the "women are the weaker sex" sort of mentality, all honour must, nevertheless, be accorded these girls for taking on a job at which many a strapping young man might well quail.

As at present envisaged, a parachute team consists of five people: a medical officer, two nursing sisters and two nursing orderlies. The nursing sisters are members of

"Flight" photograph.

*Watched by the D.G.M.S., the medical officer, nursing sisters and orderly attend one of the "casualties" and simulate giving a blood transfusion.*

## Paramedical Aid . . . . .

the Princess Mary's Royal Air Force Nursing Service, whilst the doctor and nursing orderlies are, of course, R.A.F. personnel. The demonstration was made at the Training School's dropping field at Weston-on-the-Green, before the critical gaze of Air Marshal P. C. Livingstone, C.B., C.B.E., A.F.C., F.R.C.S., Director-General of Medical Services, R.A.F., and of Miss Helen Wilson Cargill, R.R.C., Matron-in-Chief of Princess Mary's Royal Air Force Nursing Service. Both the Director-General and the Matron-in-Chief expressed themselves as being more than pleased with the work done.

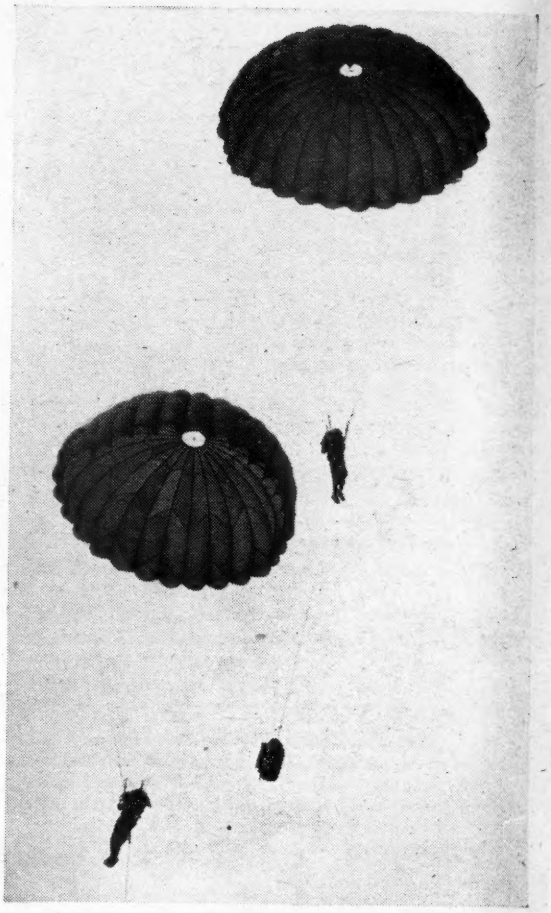
In the centre of the airfield at Weston, a square white target was pegged down about 250 yards across wind from the "casualties." The Dakota, from which the team were to drop, first made a dummy run across the target, and then, on its second run, dropped a drifter, i.e., a member of the Parachute Training School staff, who made his descent without applying correction, and so determined the drift to be expected. The surface wind was light and steady at about 5 m.p.h. and, as the drops were made from about 800ft, the landings were all made within roughly 100 yards of the marker target.

### Action Procedure

On the third run up, the pilot kept the Dakota in the eye of the wind, and the first team then made their drops. First out was the medical officer, followed at one-second intervals by the orderlies, each with a kitbag dangling 20ft below on a lanyard, and then by the two nursing sisters. As the team descended, an instructor gave them corrections by means of a portable loud-hailer unit, the speakers of which were trained upward. The landings made, the parachutists rolled over, gathered up the "bottom" shroud lines to spill the wind from the canopies, unbuckled their harness and, leaving their parachutes to be gathered up later, ran the intervening 300 yards to the casualties. The time from the first man leaving the aircraft to the team reaching their patients was a little under four minutes. By the time that the first team had reached the casualties, the second team were making their drops, following exactly the same procedure.

There were three "casualties"—volunteer airmen from the School—all of whom entered fully into the spirit of the exercise, despite their appearance at times of bearing their simulated suffering with extraordinarily cheerful fortitude. The first man was supposed to have suffered a fractured femur, the second was supposed to have sustained severe chest injuries, whilst the third was supposedly suffering from severe lacerations to the scalp, and concussion. In what appeared to be virtually no time at all, the medical equipment was removed from the kitbags, water was heated over a small Primus-type stove, dressings were taken from sterilizing cans, and the man with the broken thigh had it bound up in a St. Thomas's splint, whilst his companions in adversity were respectively given a blood transfusion and a drink.

*The Matron-in-Chief of Princess Mary's R.A.F. Nursing Service, Miss Helen Wilson Cargill, poses beside Air Marshal P. C. Livingstone, C.B., the Director-General of Medical Services, Royal Air Force.*



*Each nursing orderly is preceded by a kitbag of equipment, on a 20-ft lanyard.*

As previously stated, we had to imagine that some of the larger equipment used had already been dropped before the descent of the medical teams. This equipment comprised the stretchers, and a large, walled, pitched-roof tent to serve as a shelter and operating theatre. The stretchers were quickly assembled, blankets unpacked and swathed round the patients, parachutes rolled up and used as pillows, and the tent speedily erected by the orderlies, whilst preliminary attention was being given to the patients. As a demonstration of the working of a service only but a few weeks' old, this was a singularly impressive thing to see.

### First Possible Aid

Air Marshal Livingstone, who earlier this year was appointed an Honorary Surgeon to the King, said that, although the new parachute medical service had obvious applications in time of war, its functions were equally as important in peace. Aircraft have been known to crash in the most inaccessible places, at times in conditions of weather, as well as terrain, which make it impossible for aid to reach possible survivors for many hours, sometimes even days. Parachute medical teams can be on the spot with a minimum of delay and, whilst this does not purport to be anything other than first-aid, it does qualify for the term "first possible aid" and, by the very nature of the equipment and personnel used, invests the term with an importance far in advance of that normally implied.

The members of the first team who are now in the last stages of their training are:—

| | |
|---|---|
| Medical Officer ..... | F/O. T. C. L. Brown, R.A.F.M.S. |
| Senior Sister ..... | Miss J. M. Maffy, P.M.R.A.F.N.S. |
| Sister ..... | Miss M. I. Savage, P.M.R.A.F.N.S. |
| Sister ..... | Miss M. M. Bradley, P.M.R.A.F.N.S. |
| Sister ..... | Miss O. E. V. Craig, P.M.R.A.F.N.S. |
| Nursing Orderly .... | Cpl. J. Walsh, R.A.F.M.S. |
| Nursing Orderly .... | Cpl. J. Latchem, R.A.F.M.S. |
| Nursing Orderly .... | L.A/C. R. Clarke, R.A.F.M.S. |
| Operating Room Assistant ..... | L.A/C. C. M. Pace, R.A.F.M.S. |

When the team arrived at the Parachute and Glider Training School at Upper Heyford, the nursing sisters were placed in charge of S/O. Audrey Penfold, W.A.A.F., who became so enthusiastic with the aims and work of the team that she applied for, and received, permission to take the full parachute training course with her charges. S/O. Penfold thus has the distinction of being the only W.A.A.F. officer to have gone through the parachute school training course.

The present plan is to train about six teams a year at Upper Heyford. The course lasts for four weeks and includes synthetic training, two descents from a moored balloon and six from aircraft. It is intended that refresher training will be given at periodic intervals. Fitness standards required are generally the same as those required for normal R.A.F. service. All volunteers are given a medical examination before starting their parachute training. The upper age limit is 32 and individuals must be under 6ft in height and under 12 stone in weight, experience having shown that larger individuals are the more prone to minor landing injuries.

Experiments are now being made by the Transport Command Development Unit, in conjunction with the R.A.F. Medical Training Establishment, to determine the best way of packing delicate medical equipment so that it will avoid damage from landing impact. At present, each team carries about 200 lb of equipment, mainly for dealing with blood transfusions, severe burns, shock, broken limbs and other injuries, such as might be sustained in aircraft crashes.

The winged wand of Mercury, classic symbol of medical science, and the badge of the R.A.F. Medical Service, takes on new and added significance with the inception of paramedical aid.

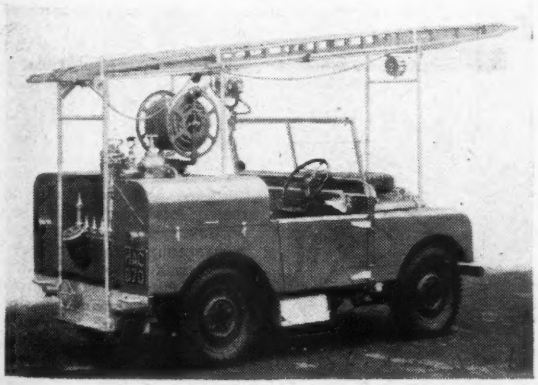
## R.Ae.S. COMMONWEALTH DIVISIONS

AT a meeting of the Council of the Royal Aeronautical Society on September 30th, it was resolved that immediate action should be taken to establish Divisions of the Society in Australia and in New Zealand, to become operative from January 1st, 1949. This move is considered to be a great and new experiment in the history of the Society, and the President and Council are convinced that its objects will be furthered by the establishment of such Divisions within the British Commonwealth, and these two may be regarded as the forerunners of others.

Under the resolution the Divisions will have power to form Branches of the Royal Aeronautical Society in their own countries similar to those formed in Great Britain. Members of the Divisions will all be full registered members of the Society, and each Division will have the power to act, in most respects, exactly as the parent body in London. The selection of members as Associate Fellows will, however, remain the responsibility of the Royal Aeronautical Society in London, so that a consistent standard will be maintained throughout the world. There will be no interference from London in the activities of Divisions in their own countries, and they will not necessarily be tied in any way by any of the rules or regulations which may apply to Great Britain or to any other Commonwealth Division.

## FIRE FIRST AID

MANY people from all branches of the aircraft industry took the opportunity offered by the Commercial Motor Transport Exhibition at Earls Court last week to examine the great variety of large and small transport vehicles for passengers, and those for special duties such as the latest examples of open and enclosed David Brown tractors. A newcomer to the Land-Rover range of vehicles is illustrated below. It will be remembered that the Land-Rovers gave good service to the British team taking part in the International Gliding Contests in Switzerland. This new, light, fire-fighting vehicle is intended to give immediate first aid pending the arrival of heavier engines. It can be equipped for water or foam extinguishing and will tow a pump. Its power, light weight and four-wheel drive—both forward and in reverse—make it capable of fast cross-country work. It can cope with up to 2ft 6in of water, deep ditches, and can, if necessary, pull a heavy trailer. The maximum speed approaches 60 m.p.h. One or two of these small vehicles available at airfields—perhaps stationed at the end of the runway—might, by their arrival on the scene of action within or just outside the airfield boundary, prove invaluable in the event of minor mishaps or accidents on approach or landing.



*The Land-Rover equipped as a light fire-fighting vehicle.*

## SIDDELEY TROPHY ENTRIES

THE race for the Siddeley Trophy is to be held on October 16th at the Wolverhampton Aero Club. Two heats will be flown in the morning, one starting at 10 a.m. and the other at 11 a.m. The final will start at 2 p.m. and will probably consist of 16 competitors, 8 from each of the eliminating heats. The final will be broadcast on the B.B.C. Midland programme between 2.30 and 3 p.m.; the running commentary is to be given by Peter Cairns. The following list of competitors, their aircraft, and racing numbers is complete at the time of going to press:

| Aircraft | Engine | Pilot | Club | Racing Number |
|---|---|---|---|---|
| Hawk Trainer 3 | Gipsy Major I | D. C. Jemmett | Wolverhampton | 1 |
| Miles Hawk Speed 6 | Gipsy VI Mark I | R. R. Paine | " | 2 |
| Hawk Trainer 3 | Gipsy Major I | D. J. Jemmett | " | 3 |
| Auster JI ... | Cirrus Minor II | R. A. Walley | " | 4 |
| Auster JI ... | Cirrus Minor II | J. A. Bradley | " | 5 |
| Miles Mentor ... | Gipsy Queen I | P. W. Bayliss | " | 6 |
| Auster JI ... | Cirrus Minor II | R. H. Timmis | " | 7 |
| Hawk Trainer 3 | Gipsy Major I | C. Turnill | " | 8 |
| Proctor 4 ... | Gipsy Queen II | E. R. Pyatt | " | 9 |
| Auster Arrow | Continental C75/12 | L. E. T. Barley | " | 10 |
| Tiger Moth 2 ... | Gipsy Major I | J. C. Rice | " | 11 |
| Auster 5 ... | Lycoming O/290/3 | L. H. Hamp | " | 12 |
| Tiger Moth 2 ... | Gipsy Major I | E. J. Morton | Coventry | 14 |
| Proctor I ... | Gipsy Queen II | J. Oliver | Wolverhampton | 15 |
| Tiger Moth 2 ... | Gipsy Major I | K. Moss | London | 16 |
| Auster JI ... | Cirrus Minor II | D. Everall | Wolverhampton | 17 |
| Hawk Trainer 3 | Gipsy Major I | H. T. Ryan | " | 18 |
| Gemini I ... | Cirrus Minor II (2) | R. E. Bibby | Wirral | 19 |
| Auster JI ... | Cirrus Minor II | C. W. Thresh | " | 20 |
| Miles Hawk Major | Gipsy Major I | T. W. Shipside | Nottingham | 21 |
| Auster JI ... | Cirrus Minor II | K. F. Graham | " | 22 |
| Auster D ... | Cirrus Minor I | A. J. Penzer | Midland | 23 |
| Auster JI ... | Cirrus Minor II | W. M. Morris | " | 24 |
| Tiger Moth 2 ... | Gipsy Major I | M. A. Harper | " | 25 |
| Miles Monarch | Gipsy Major I | G. S. K. Haywood | Derby | 26 |
| Hawk Trainer 3 | Gipsy Major I | B. R. Hall | " | 27 |
| Hawk Trainer 3 | Gipsy Major I | E. N. Fidler | " | 28 |
| Comper Swift... | Pobjoy R | A. L. Cole | Luton | 29 |

# HERE AND THERE

*ICE MUSHROOM : Flying over a strangely formed ice floe, a helicopter equipped with pontoons, belonging to a joint Canadian-U.S. expedition, goes in to land supplies for the arctic weather station at Dealy Island.*

## Kelvin Medal for Sir F. Whittle

AT the meeting of the Institution of Electrical Engineers held on October 10th to open the 1948-49 Session, Sir John Anderson presented to Sir Frank Whittle the Kelvin Medal which is awarded every three years and is one of the highest awards of the engineering profession. The medal is part of the memorial to Lord Kelvin, a pioneer of physics who died in 1907.

## R.A.A.F. Finance

AN analysis of the budget which has recently been presented to the Australian Parliament providing for a sum of £12,500,000 for the R.A.A.F. shows that this sum represents 23s per head of the population. It is felt in some quarters in Australia that this is hardly a favourable comparison with the figure of £32 per head of the population being spent by the U.S.A. on its Air Force.

## Aero Club Meeting

A SPECIAL general meeting of the members of the Royal Aero Club is to be held on October 27th at 119, Piccadilly, London, at 6.15 p.m. The agenda concerns alterations to the rules of the club regarding subscriptions of Life, Overseas, Town and Country members. It is proposed also that the entrance fee shall be waived for candidates elected under 25 years of age.

## R.Ae.S. Belfast Branch Meeting

RESULTING from the transfer of Short Brothers and Harland employees from Rochester to Belfast the Medway and Belfast branches of the Royal Aeronautical Society have been amalgamated. At the annual general meeting of the Belfast branch on Oct. 5th, Rear-Admiral Slattery, C.B., F.R.Ae.S., R.N. (Ret.), was elected chairman, and the committee elected for the forthcoming year consists of: Mr. Lipscomb, F.R.Ae.S., Mr. Boorman, F.R.Ae.S., Mr. Hambrook, F.R.Ae.S., Mr. Robinson, A.F.R.Ae.S., and Mr. Kirk, A.R.Ae.S. Mr. E. D. A. Herbert, chairman of Short Brothers and Harland, Ltd., was elected vice-president. For the forthcoming session seven lectures and two evenings of films of aeronautical interest have been arranged. Following the A.G.M. the Branch Prize was awarded to Gerald Moore.

## Visitors from Germany

ON a visit arranged by the Foreign Office to enable them to see the English way of life, a party of nine German officials, teachers, and trade union leaders recently landed at Northolt. One of these was an ex-paratrooper, and by a strange coincidence a member of the reception party was an ex-Commando, whose unit had been in combat with the German's unit during the war. The visitors were most impressed at the speed with which customs and immigration formalities were completed, the time taken to clear this particular party being 20 minutes. The visitors were interested in the possibility of helicopter services connecting airports with the centres of nearby cities.

*WESTERN COMMANDER : General J. de L. de Tassigny, C. in C. Land Forces, Western Europe, on the wing of the Meteor 7 trainer in which he flew when this aircraft visited Bretigny airfield after its tour of Turkey, Greece and Italy.*

## Recognition Contest

TO be held in the Library of the Royal Aeronautical Society on January 19th, 1949, the annual All-England Aircraft Recognition Contest is open to teams comprising three members each of units of the Royal Observer Corps, the Services, the A.T.C. and other similar aviation organizations or clubs. The trophy, at present held by the Aircraft Recognition Society, is a silver model of a Hurricane. The contest is based on 35 aircraft which may be seen flying over the country at the present time.

At the November meeting of the Society the speaker will be Mr. L. Satterthwaite, the U.S. Civil Attaché, whose subject will be: "Development of Anglo-U.S. Civil Air Relations Since 1943." This lecture will be given in the Library of the R.Ae.S. at 1900 hours on November 17th.

## Home-made Midgets

SOME of the world's smallest aircraft competed for the Goodyear Trophy this year at the Cleveland National Air Races. Entry in the race is restricted to machines powered by engines with a capacity not greater than approximately 3,000 c.c., and the resulting designs, generally using the 85 h.p. Continental flat four engine, have a remarkably compact, and not unattractive appearance. The racers are designed and constructed by the pilots and their supporters. The pre-war death rate among American racing pilots was notoriously high, and machines must now fulfil the stringent airworthiness requirements set by the Professional Race Pilot's Association before being allowed to compete in the race, which consists of ten two-mile laps. A photograph of the winning

*"Now is there any other gentleman who objects to my re-election as chairman ?"*

## HERE AND THERE

Cosmic Wind appears on page 457 of this issue. S. Wittman in his self-designed Wittman Special narrowly beat the butterfly-tailed *Swee'Pea* flown by Art Chester, to second place. Their speeds were 168.862 and 168.201 m.p.h. respectively.

### U.S. Jet Forecast

IT was reported recently that jet engines were being developed by the National Advisory Committee for Aeronautics at its Lewis Flight Propulsion Laboratory at Cleveland, Ohio, which might produce five times the power of types now in use. The report goes on to state that engines to develop 25,000 lb thrust are being contemplated.

### Gas Turbines in Italy

TURBOGAS is the name of a company being constituted and financed by all large Italian firms interested in the development of gas turbines for industrial purposes—that is all purposes save aviation. It is understood that Fiat will interest itself in the development of gas turbines for aircraft.

### Carriers as Stepping Stones

AN experimental flight began from Moffett Field, California, on October 5th to demonstrate the practicability of ferrying short-range aircraft over large stretches of ocean. The flight was undertaken by 12 U.S. Navy aircraft, including four Grumman F8F Bearcats, four F4U-4 Corsairs and four AD-1 Skyraiders; their destination was Barbers Point naval air station in Hawaii, 2,400 miles distant. Strung out along the route at 800 miles intervals were two aircraft carriers which were to be used as refuelling stations. By this means it is hoped to be able to take the shortest geographical route and, if necessary, by diversions avoid areas of bad weather or areas of possible enemy opposition.

*RUSSIAN MODEL ON TEST: Youthful model aircraft enthusiasts are shown in this photograph discussing their aircraft with hero of the Soviet Union Lt. Gen. Nikolai Kamanin, president of the Voluntary Aid to Aviation Society.*

*RACING SPECIALS: In the 1948 National Air Races in the United States, referred to on the accompanying pages, many specially built and modified military types were seen (Top): The twin Ercoupe used for stunt flying attracted considerable interest. (Bottom): The AT-6 Harvard, in which a Ranger engine has been installed, was among the modified military types, this aircraft taking part in the Kendall Women's Race.*

### Hunting Group Meeting

EXECUTIVES of the Hunting Group of aviation companies from its branches in England, South Africa, Australia, New Zealand and Canada met recently at the Caledonian Mountain Trout Club, Toronto, to review and discuss post-war developments in the field of photographic and magnetic surveying and making of maps from the air. Mr. F. L. Wills, managing director of Hunting Aero Surveys, Ltd., came from England, Mr. J. C. W. Goldthorpe from Australia, Mr. G. M. Adams, the South American sales representative, from his headquarters in Barbados. Mr. P. L. Hunting, chairman of the board of directors for the whole group, was present. Colonel C. R. Robbins and Mr. D. N. Kendall represented the African and Canadian companies respectively.

## News in Brief

The directors of the Bristol Aeroplane Company have declared an interim dividend of 4 per cent (subject to income tax) on the ordinary stock, payable on October 30th, 1948.

* * *

Airtech, Ltd., of Haddenham, Bucks, have appointed Mr. Paul Godfrey to be sales manager; he is the first person to hold the appointment on a full-time basis with this company.

* * *

According to reports from Germany the former Messerschmidt aircraft factory at Augsburg is now building prefabricated houses. Production is expected to reach ten buildings a day during 1949.

* * *

The U.S.A.F. is reported to be making preparations to move its 331st Troop-Carrier Wing to Europe on a permanent basis. It will be employed on maintenance of aircraft on the Berlin air lift.

* * *

A. Cdre. Harold Primrose, C.B.E., D.F.C., A.F.R.Ae.S., has joined Portsmouth Aviation Limited. A. Cdre. Primrose was until recently Assistant to Air Chief Marshal Sir Frederick Bowhill, Chief Aeronautical Adviser to the Ministry of Civil Aviation.

* * *

Airwork, Ltd., Heston, were responsible for the construction of the fuselage, engine bearers and all empennage components of the Youngman Baynes research aircraft, a photograph of which appeared in *Flight*, September 23rd, which was described in *Flight*, September 30th.

* * *

Mr. M. F. Coop, B.A., has succeeded Sir Charles Tennyson, whose retirement was announced in *Flight*, October 7th, as secretary of the Dunlop Rubber Company, Ltd. Mr. Coop has been with the firm since 1936 and was the head of the legal department.

* * *

The selling rights, for aviation purposes, of the well-known Aldis daylight signalling lamp and its accessories have been acquired by Smith's Aircraft Instruments, Ltd. Sales enquiries should in future be addressed to their Cricklewood address.

* * *

M. Moreau, French Secretary of State for Air, arrived at Northolt on October 6th from Paris. He was accompanied by A.V-M. R. A. George, the British Air Attaché in Paris. He has discussed the requirements of the French Air Force with Marshal of the R.A.F. Lord Tedder and also visited the de Havilland factory at Hatfield.

# CIVIL AVIATION NEWS

## *Lord Pakenham Disappoints Welsh Advisory Council : Cranfield for Airline Training : First Year of Air Transport in Malaya*

### *RADIO STATIONS IN AFRICA*

AIR FRANCE have been authorized by the French government to spend 80 million francs annually for the next few years on installing 40 new radio-security stations for air traffic in Africa. Air France was made responsible by the French Department of Civil Aviation some two years ago for the establishment of radio stations in overseas territories of the French Union, and a selected team of technicians with previous experience on the South American route began the task in North Africa and the Sahara. Stations have now been completed at Tindjouf, Fort Trinquet, Bangui, Fort Lamy and Fort Archimbault, which together with the pre-war stations at Dakar, Saint Louis, Port Etienne, Villa Cisneros and Cap Juby, already form an extensive network covering the Air France trunk routes and regional services in North, West and Central Africa. The 54 engineers and technicians will now tighten this network with the addition of the 40 new stations in the same or adjoining territories.

### *MINISTER IN WALES*

DURING his recent tour of Welsh airports, Lord Pakenham, the Minister of Civil Aviation, repeated the official view that a regular air service between North and South Wales was not at present an economic proposition. Although representations were made by members of the Welsh Advisory Council for Civil Aviation, who stressed the claims of North Wales for better communications with South Wales and London, it is understood he was not convinced that such a connection would pay for itself, and that he was more concerned with the economic factor than with anything else. He was quite sure, however, that there was a definite need for such a service, and he would endeavour to work out how it might be provided and paid for. As the party were leaving Valley, the probable northern terminus of any such service, Mr. Kenneth Davies, chairman of the Welsh Advisory Council said that Lord Pakenham was the first Minister of Civil Aviation who had come to Wales to see for himself. One outcome of the visit was that the Council had had to abandon all hope of reviving Wrexham R.A.F. Station, and that area would continue to be served by Hawarden.

### *PRIVATE PILOTS' LICENCES*

AS part of the revised code of Air Navigation Regulations the Class "A" pilot's licence will be replaced, as previously mentioned in *Flight*, by a Student's licence and a Private Pilot's licence. As in the case of the Commercial Pilots' licences, however, the new licensing procedure will not become effective until the Regulations have passed through Parliament. Pilots under training will not be allowed to fly solo until a Student Pilot's licence has been obtained, for which the only requirements are that the applicant must be aged 17 or more and to have passed a medical examination. Such a licence will permit the holder to fly under the orders of an authorized flying instructor. An applicant for the new Private Pilot's licence will have to have done 40 hours of flying, of which 15 have been solo, and also to take examinations in navigation, weather and aircraft operation. New licences will be rated separately for each of three categories of aircraft: lightweight single-engined, lightweight multi-engined, and heavier types over 12,500 lb. To fly the heavier aircraft pilots must qualify for each individual type, and, if wishing to carry passengers at night, a night-rating endorsement must be included. Holders of Class "A" licences will be able to make an exchange for the new licence on the first occasion of renewal, but only for that category of aircraft which they have been flying. An endorsement for other categories will be necessary.

### *AUSTRALIAN SAFETY PLANS*

AN allocation of £5,000,000 has been made by the Government of Australia to modernize the Continent's radio system, with special attention to safety devices. The main object is to improve communications between air and ground, and between ground stations. The cost for the first year is expected to be £1,151,000, and the balance will be used over later years. Developments are expected to include the purchase of 180 radio transmitters and 89 D.M.E. beacons. Thirty radio range stations which are now being installed are to be completed and nine more will be added. At 13 airports instrument landing systems will be provided, and lighting for night operations will be improved at all airports. Sydney and Darwin are to receive special radio transmitters and receivers.

### *CORPORATIONS' FLYING TRAINING*

THE closing down of Airways Training, Limited, at Aldermaston on September 30th called for a reorganization of flying training, conversion and check flying in the two corporations B.O.A.C. and B.E.A.C. British European Airways have now moved their training flight to Cranfield near Bedford, the College of Aeronautics' airfield, where the Corporation's gust research unit is already based. Between now and the end of March next year some 200 B.E.A. captains and first officers will pass through check flying, conversion and promotion courses which make up the winter training programme. Each course will last for a fortnight to six weeks. There are eight training captains on the flying staff at Cranfield.

British Overseas Airways, on the other hand, pass captains and first officers through similar courses at the headquarter bases of each line: York and Lancastrian training is carried on at No. 2 line headquarters, Hurn, flying-boat training at No. 4 line headquarters, Southampton, and Dakota training at No. 1 line headquarters at Whitchurch. One senior captain

*MISCELLANY: A view from the new restaurant at Schiphol—the largest at any European airport. On the wide tarmac can be seen an unusually varied assortment of transport aircraft including several Douglas DC-3s and DC-4s. Also on the left is the visiting S.A.A.B. Scandia, in the centre a Ju. 52, and on the extreme right are two Norsemen. The control tower and some airport buildings are still under construction, but those which are already completed are of modern and practical design.*

is in charge of flying training in each line, and he is responsible for supervision of training and periodical flying checks in that line only. Conversion to Constellations for the Australian route is at present in progress at Shannon, but the normal Constellation training for the North Atlantic has so far been carried on at Montreal.

B.S.A.A., who were not part of the organization at Aldermaston, used that airfield for training although all aircraft were based at London Airport. The Corporation is now negotiating with the School of Aeronautics for the use of Cranfield and in the meantime other airfields with suitable facilities are being used.

*K.L.M. EXPERIMENT: With the Netherlands Helicopter Society's Sikorsky S.51 K.L.M. have been experimenting with town-to-airport services. It is understood that such services are being considered for the Utrecht Fair. Dr. Albert Plesman, president of K.L.M. and president-elect of I.A.T.A., is seen leaving the cockpit.*

## *LORD DOUGLAS ON B.O.A.C. BOARD*

ON his appointment as chairman of the Agricultural Research Council, Lord Rothschild, G.M., has resigned from the Board of British Overseas Airways Corporation. In his place the Minister of Civil Aviation has appointed Marshal of the Royal Air Force Lord Douglas of Kirtleside, G.C.B., M.C., D.F.C., to be a member of the Board with effect from October 1st. Lord Douglas has filled no official appointment since he served as Commander-in-Chief and Military Governor of the British Zone of Germany from April, 1946, to November, 1947. Since July this year he has, at the invitation of the Minister of Civil Aviation been engaged in investigating those parts of the Civil Aviation Act which are concerned with the appointment of agents and associates to the Corporations. His report is now in the hands of the Minister.

*Lord Douglas.*

## *NAVIGATION INSTITUTE'S WINTER SESSION*

PAPERS will be read to the Institute of Navigation at the Royal Geographical Society, 1, Kensington Gore, London, S.W.7, once a month throughout the winter and next spring, until June 17th. The comprehensive programme covers many features of navigation and radar, On Friday, December 17th, H.R.H. the Duke of Edinburgh will open an exhibition of Navigation through the Ages, held jointly with the Royal Geographical Society, and three meetings in connection with the exhibition will follow at 5 p.m. on December 17th and on the evenings of December 20th and January 10th. The exhibition will be open until January 20th.

## *LONDON AIRPORT LIGHTING*

A SYSTEM of low and high intensity approach lighting has been installed on the approach to runway 280 deg. at London Airport on an experimental basis. Two lines of omni-directional low intensity red lights extend 4,000ft from the end of the runway, diverging at angles of 2 deg. High intensity red lights beamed in the direction of approach are installed alongside each low intensity light. At 1,500ft from the end of the runway and across the direction of approach there is a marking bar consisting of four low intensity red lights and four sodium lamps between the rows, and three red high intensity lights and three low intensity lights outside the rows. The systems will be displayed by request from pilots or at the discretion of Air Traffic Control.

## *MALAYAN AIRWAYS LOSSES*

AT the first general meeting since Malayan Airways Limited commenced active operations, a loss amounting to $153,046 was announced. Adequate allowance was made for depreciation of aircraft, property and other assets, and ample reserves had been raised to cover future liabilities in respect of Cs. of A., and also leave-pay and passage money for European staff. The company was financed by way of loans from two major shareholders, neither of whom had made any charge for the service. Reorganization of the company's capital had been completed, and the company's authorized capital now stood at $5,000,000, of which $2,500,000 had been issued. The fleet now consisted of two Airspeed Consuls and six Douglas DC-3s. Late delivery of aircraft had affected early progress, but by November last year external services were inaugurated and the pattern of Malayan Airways' operations in the Malayan Peninsula and also, with one exception, the countries most closely connected with Malaya geographically and economically, was completed within the first year of operations. Regular flights to Borneo will not be permitted until Jesselton and Sandakan airfields are completed, which should be early next year. By agreement with the governments of Singapore and the Federation of Malaya the company will operate certain minimum services charging fares and rates not exceeding the stated amounts, and will be given certain concessions in the matter of customs and excise duties and airport facilities over a period of ten years. Maintenance staff

## Civil Aviation News . . . . .

had been seconded from B.O.A.C., but direct employees are being steadily recruited and an extensive apprenticeship scheme for local boys has been started. All pilots are for the time being English, but half the company's radio officers are Malayans.

### *ASSISTING VISITORS TO FRANCE*

AIR TRAFFIC, LTD., a company formed in December, 1947, to provide assistance to British air charter companies, aircraft contractors, clubs and private owners landing in France, has nearly completed its first year of activities at Toussus-le-Noble, and has just opened an establishment at Le Bourget. A third staging post is to be opened at Nice following the successful outcome of present administrative problems and negotiations. The services offered by Air Traffic, Ltd., include the meeting of all private and charter aircraft by English-speaking staff who escort passengers through police, customs and currency formalities. For those in transit a waiting-room is provided until the aircraft is ready to leave again, while for those staying overnight transport is arranged to hotels at which accommodation arrangements are made. Similar services are offered to crews of machines arriving at Toussus-le-Noble and the staff, in addition to helping with the usual formalities, translates met. reports and assists pilots in preparation of flight plans. Refuelling, hangarage, engine heaters and starters are included in the service, and currency exchange facilities are provided for air crews.

# *BREVITIES*

B.O.A.C. offices in Malta will be taken over at the end of October by B.E.A., Alitalia, Malta Airways and Air Malta. B.O.A.C. aircraft on the Damascus and Persian Gulf routes, and also on the route to Ceylon, will continue to stop at Malta.

* * *

On October 4th British European Airways re-introduced the Jersey-Rennes service with Rapide aircraft. The flight will take about 50 minutes and will be flown weekly in each direction leaving on Monday mornings and returning the same afternoon.

* * *

Twenty-four Martin 2-0-2 airliners have been grounded by Northwest Airlines as a result of an accident investigation. A Martin 2-0-2 crashed on August 29th, and it is thought that it "may have come apart when it was hit by tornadic winds."

* * *

It is understood that representatives of air transport companies from Eastern European countries met recently at Prague to discuss administrative, tactical and financial problems. The meeting was attended by delegations from Russia, Czechoslovakia, Poland, Yugoslavia and Bulgaria.

* * *

Two new branches of the Society of Licensed Aircraft Engineers have been formed at Gatwick and North Cumberland. Mr. Collins, service manager of Airwork, Limited, has been elected chairman of the Gatwick branch, and Mr. H. Jackson of the North Cumberland branch. One of the main objects in forming the latter was to set up instructional classes for student members studying for maintenance engineers' licences.

* * *

A regular air service between Ceylon and the United Kingdom with stops at Madras, Bombay and Pakistan, is expected to begin in November, according to a recent statement by Sir John Kotalawala, Ceylon Transport Minister. The Minister was to conclude the agreement between India and Ceylon at Delhi on October 6th.

Aer Lingus have announced reductions in winter fares with effect from October 31st. Simultaneously, excursion fares will be introduced on the major cross-Channel routes. For example, a 10-day excursion fare of £12 12s will be available for mid-week travellers on the Dublin-London service. On other cross-Channel routes 3-day excursions will be made valid for all days of the week. The winter time-table provides 33 services a week between Dublin and London and 23 a week between Dublin and the north of England.

* * *

Since British civil aircraft joined the Berlin air lift on June 30th, they have flown about 7,500,000 miles in more than 22,000 sorties. During that time British aircraft have delivered 35 per cent of the total of 273,993 metric tons of supplies, and an average of nearly 200 sorties daily is being flown.

* * *

British South American Airways has negotiated the purchase of five Avro Tudor V aircraft. This type is a freighter version of the Tudor II, and will be put into service on the Berlin air lift as soon as conversion from passenger accommodation has been completed. The Corporation already has one Tudor IV in service on the airlift and another one in preparation.

* * *

Statistics issued by British European Airways for the month of August maintain the steady increase over last year's returns. The total of 84,252 passengers carried was an increase of 7,221 over August, 1947, freight carried was nearly doubled at 830,029 lb, while mail was considerably more than doubled at 522,667 lb. Route mileage has decreased in the U.K. services from 6,448 to 4,371, but increased slightly on Continental services from 11,188 to 11,691.

* * *

Air France are planning an extensive freight network which started with the opening of two lines during the first week of October linking the silk and industrial centre of Lyons with the North African commercial town of Algiers, and another linking Algiers with Oran and Casablanca, Morocco. The company will fly Languedoc aircraft once a week carrying between 10,000 and 12,000 lb of freight. There will be an enormous saving in time on the Lyons-Algiers-direct air service when compared with the rail and boat surface route. Although the charge works out at approximately 1s 3d a mile, there will be very considerable saving in insurance and packing costs, and, of course, in the quicker turnover of stock.

Following the amalgamation of the Air France Glasgow-Paris and Manchester-Paris services, a reduction in fares has been made.

* * *

Although operations across the North Atlantic this winter will be on a similar scale to those of last winter, an increase in the sleeper accommodation is expected. Air France, which has been operating one sleeper a week, has already increased this to two, and the French company is also increasing the total flights to eight a week between New York and Paris, as

*"Flight" photograph.*

***FLYING HIGH:** Percival's first Prince is undergoing altitude tests. Number two is expected to fly in a week or so and then proceed with overseas proving flights.*

## Civil Aviation News . . . . .

against five during last winter. S.A.S. operated three services a week last winter, but expects to operate no fewer than four during 1948.

* * *

Interim terminal buildings which are to be erected at London Airport will be of semi-permanent unit construction 2 or 3 storeys high and will remain in use until the final portion of the permanent terminal buildings is erected. It is hoped that experience gained from the operation of these interim buildings will contribute to the final design and layout of the central area.

* * *

It is understood that the recently announced decision of British European Airways to close down their aircraft maintenance base at Speke and to transfer the work to Renfrew was taken entirely on economic and operational grounds. The decision has been adhered to despite some opposition from Members of Parliament, and a full explanation of reasons for the step taken has been circulated to the staff of B.E.A. at Speke through their trade union machinery.

* * *

Short Brothers and Harland, Limited, have received an order from Aviacion del Litoral Fluvial Argentino (A.L.F.A.), of Buenos Aires, for two 51-seater Sandringham flying-boats. The 6 seats have been added to the standard 45-seater version by reducing the size of some of the seats. The flying-boats are intended for the company's South American routes, and will supplement the 3 Short Sandringhams which are now in use on their present services and which are reported to be working at full capacity. Both the Sandringhams, which are powered by Pratt and Whitney twin-Wasp engines, will be delivered within 3 months.

* * *

B.S.A.A. figures for the month of July show some increases over the preceding month, and the corresponding month last year. The total number of passengers carried was 1,461, against 1,214 in 1947. Mail and cargo totalled 57.7 tons, compared with 54.7 in 1947, and the route miles in operation amounted to 21,382, a substantial increase over the route miles in July, 1947, which were 15,705. The increase is largely explained by the change of route—the Corporation is now flying Tudors to South America across the North Atlantic.

* * *

Scottish Aviation, Limited, has recently finalized a contract with F.A.M.A., the Argentine airline, for converting two Douglas C.54 Skymasters to 44-seater airliners. The value of the order will be in the region of £25,000-£30,000. Both aircraft were purchased by the Argentine company from Sante Fé Skyways, by which company they had been used for the transportation of meat in the Argentine. The fuselage had no windows at all in the main compartment, which was especially insulated and refrigerated for transporting meat.

* * *

Northolt airport reached the new high figure of 67,300 scheduled-service passengers passing through in August. The previous highest had been in July this year, with 61,277 passengers. August is normally the busiest month of the year for airports. There were 1,994 aircraft arrivals on scheduled services and 1,993 departures; 356,890 lb of mail and 745,182 lb. of freight was handled.

August traffic at London Airport was 42,242 passengers on regular scheduled services—1,146 aircraft arrivals and 1,176 departures. Mail totalled 546,545 lb and freight 1,030,911 lb.

* * *

From April 19th until the end of August a total of 29,545 passengers were carried by Scandinavian Airlines System on internal routes in Norway. During the summer period the company carried 685,000 lb of luggage, 114,000 lb of cargo and 240,000 lb of mail. The total distance flown on the routes amounted to 475,000 miles. As was the case last year, the greatest traffic was on the S.A.S. Arctic service from Stavanger via Bergen, Oslo, Trondheim, Bodö and Harstad to Tromsö. Domestic services in Norway cease this month owing to weather conditions which make further operation impossible.

# FROM THE CLUBS

FIRST formal dance of the season at the Brough Flying Club took place on Sept. 24th. Over 100 members and guests attended, and the event was a great success. Three new flying members have joined the club recently.

* * *

SLIGHTLY improved weather in September resulted in an increase in flying activity among members of the Derby Aero Club, and recent visits were made to Le Touquet, Ostend, Dinard and Deauville. The club also attended the Butlin rally at Speeton in force, but the contingent which went to the S.B.A.C. show at Farnborough on the second public day were caught there in the deluge. A recent dance was held at the clubhouse and plans are going ahead for the annual ball at Burnaston House on December 10th.

* * *

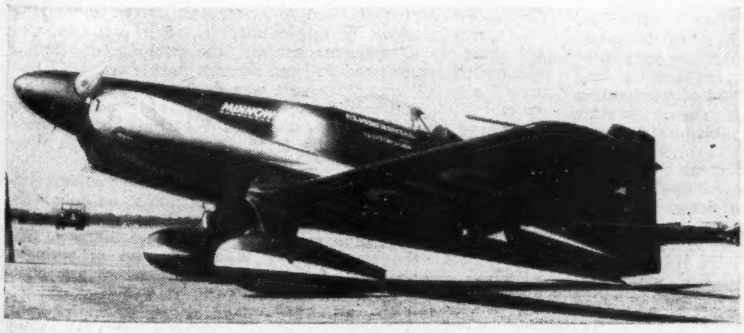
A FLYING meeting took place at the West London Aeroplane Club at White Waltham Airfield on Saturday, September 25th. Besides balloon bursting and bombing competitions, which were won by Mr. J. Game and Mr. P. Shaw, respectively, both of the Fairey Flying Club, there were demonstrations of the Tipsy Junior, a Firefly and a Vampire, the latter being flown by S/L. Oxspring, D.S.O., from Odiham. Mr. Philip Wills gave a display of gliding, and Major Willans made a parachute descent. Members and guests present numbered 400 at the opening of the new clubhouse, which was followed by an impromtu dance.

* * *

FLYING hours accomplished by members of the Northamptonshire Aero Club during September amounted to 40. Many of the club's private owners have visited the Continent and visits have been exchanged with numerous British clubs. Six new flying members joined during September. The first dance of this season was held on October 1st. Social amenities have been increased by the addition of two hard tennis courts which will be available to members all the year round.

* * *

FLYING instruction at the Cinque Ports Club ceased on October 1st. This decision was taken in consequence of the lack of official backing and the high cost of flying which has reduced the local support for this aspect of the club's activities. However, Hugh Kennard, who is carrying on charter and "joy-ride" flying as Air Kruise, Ltd., at Lympne, has launched the Kent Coast Flying Club and offers instruction from £2 10s per hour on Magisters. He receives the full co-operation, support and good wishes of the Cinque Ports Club, who will continue to organize air rallies and races as before. The club hut on the airfield has become an airport canteen for those working there. Outstanding membership balances are being transferred to the new club and continued membership of the Cinque Ports Club will be at a nominal fee; the club will therefore retain its name and hangar accommodation for private owners and visitors by air who will continue to be welcome at the Lympne Country Club for meals and overnight accommodation.



*GOODYEAR WINNER: A Cosmic Wind flown by Mr. H. R. Salmon at a speed of 169.8 m.p.h. won the Goodyear Trophy in the Cleveland National Air Races, 1948. The design was originated by a group of Lockheed employees for the 1947 race, and three of the type were built; the other two were fifth and seventh this year.*

# Tie-Rod Transmission

## *An Ingenious Drive System Used on the Landgraf Helicopter*

By MAURICE F. ALLWARD

THE Landgraf Model H-2 Helicopter contains several unusual features, not the least interesting of which is the tension-rod drive to the twin rotors.

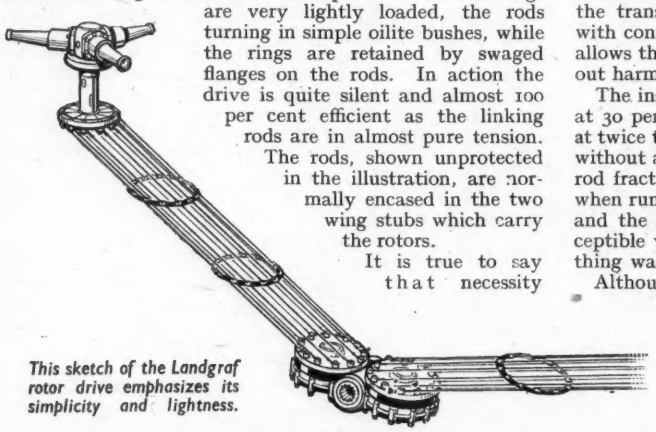
This drive incorporates one worm only on the crankshaft, meshing with two worm wheels which are connected directly by the tension rods to discs under the rotors. Thus there are no toothed gears of the bevel or spur type, and no long rotating shafts in the transmission.

Each end of the twelve high-tensile steel rods is connected to special end fittings incorporating a bearing which rotates on bolts fixed to the worm wheel and rotor discs. A third of the way along from each end, two Micarta spreader rings are positioned, which prevent the rods from bending outwards under centrifugal loads when in operation. These rings are very lightly loaded, the rods turning in simple oilite bushes, while the rings are retained by swaged flanges on the rods. In action the drive is quite silent and almost 100 per cent efficient as the linking rods are in almost pure tension.

The rods, shown unprotected in the illustration, are normally encased in the two wing stubs which carry the rotors.

It is true to say that necessity was the mother of this drive. The construction of the prototype during the war was severely hampered by shortages, and it proved impossible to get any new bevel gears cut for the normal type of drive which had been designed, nor was it possible to utilize any existing gears. And so, faced with the prospect of a complete stoppage of work, Fred Landgraf set himself the task of developing an alternative drive which did not use any bevel gears; the tension-rod drive was the result. It was originally intended to use this only in the prototype, but it has proved so outstandingly successful that it is to be retained in the production aircraft, unless some hitherto undeveloped snags appear.

THE Landgraf H-2 helicopter is an experimental single-seater with two laterally disposed three-bladed rotors. Instead of changing the pitch of the blades, their camber is varied by hinged flaps on the trailing edges.



*This sketch of the Landgraf rotor drive emphasizes its simplicity and lightness.*

One advantage is that the complete installation is some 30 per cent lighter than the normal torque-tube bevel-gear drive would be, an important consideration on helicopters with their present limited payloads. Another is that the inherent "spring" of the rods very effectively dampens the transmission of engine vibration to the rotor heads, with consequent decrease in wear. The same "give" also allows the rotor wing stubs to flex under gust loading without harming the drive system.

The installation in the Landgraf Model H-2 has been run at 30 per cent above the normal speed of 485 r.p.m., and at twice the normal loadings on a test bench for many hours without any faults developing. To ascertain the effect of a rod fracturing, two were loosened at one end for one test; when run up, the rods merely bent slightly without fouling, and the system still functioned fairly well, but with perceptible vibration, just enough to warn a pilot that something was wrong.

Although it is a dangerous thing to claim in the aeronautical world, this drive appears to be the first of its kind to be used on an aircraft, with the possible exception of an accessory drive of an early type of aircraft piston engine.

The system should lend itself well to larger rotors and lower speeds; in fact, the slower the speed, the more efficient the drive becomes. After the "bugs" that, to follow tradition, are sure to appear, there seems to be no reason why the system cannot be used elsewhere successfully and with advantage.

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### POLYTETRAFLUOROETHYLENE

THE above name—and what a name—is that given to a quite extraordinary new plastic material; extraordinary is used advisedly, for the electrical and mechanical properties of the material are unique. Known generally for convenience as P.T.F.E., this new polymer is manufactured in this country in powder form by Imperial Chemical Industries. However, there are considerable difficulties in the forming technique and it is only after two years' of intensive development work that British Mechanical Productions, Ltd., of London and Bristol, have successfully established a method of production. In this, they had the benefit of considerable primary research work undertaken at the Royal Aircraft Establishment, Farnborough.

Its molecular structure gives P.T.F.E. a greater resistance to temperature than any other plastic and combines first-class electrical properties with high chemical resistance. These qualities have particular applicability to electrical and intercommunication equipment in aircraft, where relatively high temperatures may be reached. Transparent in thin sections, but waxy in appearance in thick sections, P.T.F.E. withstands the attack of all other materials with the exception of alkali metals. It can be boiled in alkali hydroxides, hydrofluoric acid, fuming nitric acid or aqua regia with no change in weight or properties. It is water-repellent, non-absorptive, non-flammable, insoluble and has no true melting point.

When subjected to heat, P.T.F.E. undergoes a transition from its solid phase at 327 deg. C., with a sharp drop in strength. Its maximum surface temperature for retention of shape is 250 deg. C., but it will not decompose below 400 deg. C., whilst its strength and dielectric qualities are retained at temperatures between 38 and 260 deg. C.

### SECURITY IN SHIPMENT OF JET UNITS

THE Edo Corporation of America, well known as manufacturers of floats for marine aircraft, recently turned their attention to a different subject, the packing of turbojet engines to assure freedom from damage during transit. Their new "elastic" container unit was designed to a U.S. Navy specification, and would appear to give full protection from the heavy impact shocks, capable of disturbing the balance of such power units, and liable to be suffered through rough handling during transportation.

Made almost entirely from aluminium, the complete unit comprises three main components; an engine stand on wheels; an anti-moisture barrier in the form of barrels encasing the engine completely, pressure-balanced through a Silica-gel filled orifice; and the elastic outer cage made up of springing members arranged to absorb the greater part of any shock suffered by the complete cargo. Tests showed that the container would reduce an exterior load of 47g to one of 8g on the engine itself.

The engine in its stand and moisture drum but without the protective cage is in a convenient form for air transportation, and the weight is some 1,000lb less than when a wooden crate is used for the same purpose.

The Sea Hornets and Sea Furies taxy out at Idlewild.

# BRIGHT AND BREEZY

## The Navy's Crack Aerobatic Squadron in the New World

TO Lieutenant-Commander D. B. Law, R.N., Officer Commanding No. 806 Royal Naval Aerobatic Squadron, we are indebted for the following notes dealing with the squadron's recently concluded American/Canadian tour, which proved so memorable to performers and spectators alike.

No. 806 Squadron, with one de Havilland Sea Vampire, two D.H. Sea Hornets, two Hawker Sea Furies, four pilots, one pilot/engineer and a de Havilland representative, gave its principal aerobatics displays in Halifax, New York, Toronto and Ottawa. The squadron arrived in H.M.C.S. *Magnificent* on June 1st, and disembarked at Dartmouth, Nova Scotia, to commence a working-up programme for its first performance, which took place on July 21st before some 10,000 people. The aircraft were behaving well, morale of the pilots was high, the engineers were happy, and all looked well for the big opening display at Idlewild, New York. Four days later the aircraft flew south to Floyd Bennett Field, Brooklyn, N.Y.

The Hornets and Furies arrived on time, but the Vampire, with a cracked canopy, became the first jet aircraft to land at Portland, Maine. Mr. Norman, the D.H. representative, flew in from Halifax, tasted his first American hospitality, repaired the canopy, and the Vampire flew into New York two days later. Maintenance personnel followed by train.

On Saturday, July 31st, when President Truman officially dedicated the largest and newest international airport in the world, flying started at 11 a.m. "Come 4 p.m.," writes Lt.-Cdr. Law, "some thousand aircraft had flown over in impressive modern array. At 4.30 p.m., 806 Squadron performed. There were five aircraft to demonstrate, and four pilots available, so it was necessary for one to land halfway through the 15-minute demonstration and change machines on the runway." The flying consisted of the following: (1) *Two Sea Furies*—Opposite take-off, passing in centre of runway and both executing a roll-off-the-top from take-off. (2) *Two Sea Hornets*—Roll in formation, with one engine stopped. (3) *Two Sea Furies*—Line-astern aerobatics. (4) *One Sea Fury*—Individual aerobatics, including three vertical rolls, hesitation roll and inverted flying. (5) *One Sea Hornet*—Loop with both engines stopped. (6) *One Sea Vampire*—Double roll-off-the-top, and rolls. This programme was given seven times, and, on the last day, which was Navy Day, the Squadron combined in a fly-past

The C.O.'s Sea Hornet 20 above the Horseshoe Falls, Niagara.

*Sea Furies escort the Squadron's single Sea Vampire over Toronto.*

with the "Blue Angel" Bearcats of the U.S. Navy.

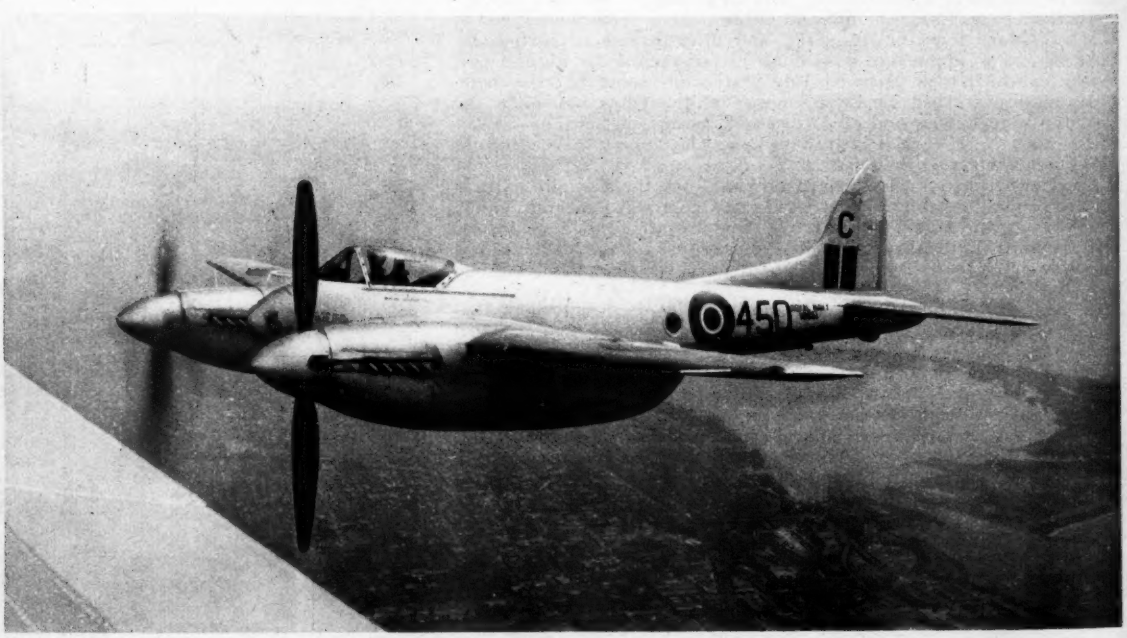
Back in Halifax, the Squadron recuperated and prepared for the Canadian National Exhibition at Toronto. On August 25th the unit reached Toronto. "A different technique was required here," reports Lt.-Cdr. Law, "as the display area was not an aerodrome, but along the water front of Lake Ontario. A 15-minute aerobatic show was given every evening at 5.30 p.m. with the following innovations: A 'vic' of Sea Furies performed loops and rolls; two Sea Hornets looped in formation, each with one engine stopped; and the Sea Vampire and a Hornet did formation loops."

The Squadron called at Ottawa for another show, and on September 12th all aircraft flew on to Halifax at an average speed of well over 300 knots. This was the last occasion on which the Squadron flew before disbanding.

**THE following message from Admiral Mountbatten was received by No. 806 Squadron, whose exploits in America and Canada are described and illustrated herewith:**

**"I cannot tell you how proud I felt of the Service when I saw the magnificent performance of your squadron at the Canadian National Exhibition. Please accept my heartfelt congratulations."**

*Lt. Cdr. Law displays the docility of the Sea Hornet on half-power.*

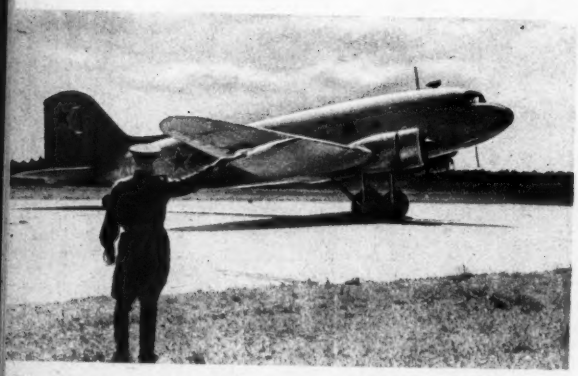


*Exhibition and exhibitor: The Sea Vampire shows its profile above the site of the Canadian National Exhibition.*

*806 Squadron complete—the aircraft line up on arrival at Toronto. Two R.C.N. Sea Furies supplemented the flying programme in Canada.*

*The Pilots: left to right—Lt. Reynolds; Lt. Sloan and Lt. Bice (both R.C.N.); Lt.-Cdr. Law; Lt. Clark; and Lt. Martin.*

# YAKS AND DAKS



THOUGH the Russian caption to the accompanying view of an array of fighters describes these as Lavochkin 7s, it will readily be seen that only the machine in the foreground is of this type, the remainder being Yaks. Present information suggests that, although new jet aircraft are available in useful quantities, piston-engined machines still preponderate in the Soviet fighter squadrons. Up to the time of writing, no jet fighters have been sighted in the Berlin area, though the older Yaks have been altogether too prominent in recent months (as witness a photograph taken by an American in one of the corridors and lately published in the *Illustrated London News*).

Another type which has become quite familiar to British and American crews is the LI-2 (otherwise designated PS-84)—known in the corridors as the "Russian Dak." Some of these aircraft (supplied under Lease-Lend) have two-row Pratt and Whitney Twin Wasps, but Russian-built examples, such as that illustrated in our second photograph, have single-row Russian M-62s.

# Some Economic Factors in Civil Aviation*

## *Breakdown of Operating Costs : Matching Aircraft to Routes : Future Power Plants*

HAVING submitted that operating costs fall naturally under three independent heads—fixed annual costs, hourly cruising costs, take-off and landing costs, which may be sub-divided into 35 items (see table on p. 437 in *Flight* of October 7th), Mr. Masefield discussed briefly the costs under the three main headings. Concerning fixed costs, he mentioned that for most modern types of aircraft a life of seven years was a reasonable assumption, with a residual value of 10 per cent for disposals sale—an equivalent of a life of 7.75 years with no disposal value. More spares were required for engines than for airframes, and not at all a high average was 100 per cent spare engines, plus 50 per cent engine spares in value.

Insurance premiums varied between 3.5 and 10 per cent of the insured value, and a fair figure seemed to be 5 per cent. According to Capt. Lamplugh, the best average figure to take for insured value over a fleet life was 80 per cent of the initial cost.

Discussing hourly cruising costs, the lecturer said that the total overhaul and maintenance cost of piston engines appeared to work out at about £3 17s 6d per thousand cruising h.p. per hour—the equivalent of about 19.5 per cent of the prime cost of the engines per 500 hours. Not enough data had yet been compiled to make possible quotations from experience of similar figures for turbine engines. However, a reasonably optimistic forecast suggested that a fair figure for a developed turbine engine in commercial service would be 15 per cent of the prime cost per 500 hours, equivalent to a total overhaul and maintenance cost of £4 12s per thousand cruising h.p. per hour. This was about 20 per cent greater per cruising h.p. than piston engines, largely on account of the higher initial cost of turbines.

Of the take-off and landing costs, representing the extra-to-cruising cost incurred for every stop, by far the largest item associated with each landing was the station costs incurred in an aircraft arrival and departure. They amounted to between 60 and 75 per cent of the total take-off and landing costs. If this item could be reduced below its present average of some £3 per ton of gross weight per landing, then substantial economies would be possible, particularly in short-stage operations. "We have, therefore, reached the point," said Mr. Masefield, "of being able to assess the economics of seven contemporary types for two basic variables:—(a) Number of hours of utilization per year, and (b) stage length in hours to be flown (block hours)." The derived data on which to work is tabulated. The utilization of every aircraft included, in a year, a number of non-revenue-earning flying hours on tests and positioning. This dead flying averaged 3 per cent of the total in present conditions. Taking the three main cost divisions for the seven aircraft (referred to in the previous section) and making allowance for the dead flying, the total annual costs and the total cost per revenue hour is set out above. The lecturer emphasized that all the cost calculations were on the assumption that scheduled operations were involved. Operation by non-scheduled charter companies should result in lower figures, chiefly because of less expensive administrative outstation and traffic services.

Results for scheduled services, expressed as hourly cost curves for each type, plotting total cost per hour against block hours for utilization, showed that there was a considerable advantage in increasing the utilization up to 3,000 hours a year (8.2 hours per day), but that the gain and economy thereafter was much less marked. Any substantially higher utilization might increase costs, chiefly because of the need to increase overhead provisions.

Facts from the cost curves expressed in related and generalized form brought out the fact that the hourly operat-

**This is the third instalment summarising the 1948 British Commonwealth and Empire Lecture. Previously, the lecturer's conclusions, headed "Masefield's Sixteen Points," (September 30th issue) and a digest of the opening sections of the paper—A National Balance Sheet: Operating Statistics: Booking Payload (October 7th issue)—have been published.*

**SUMMARY OF COST DATA**

| For Scheduled Operations | 1. Annual Fixed Cost | 2. Hourly Cruising Cost | 3. Take-off and Landing Cost (Per Landing) |
|---|---|---|---|
| 1. Rapide III (2.56 tons) | £7,412 (£2,900 p.t.) | £4 3s. 6d. (£1 12s. 3d. p.t. | £13 0s. 3d. (£5 0s. 10d. p.t.) |
| 2. Dove I (3.80 tons) ... | £13,296 (£3,500 p.t.) | £9 1s. 6d. (£2 8s. 0d. p.t.) | £18 5s. 4d. (£4 16s. 2d. p.t.) |
| 3. Dakota III (12.5 tons) | £33,656 (£2,690 p.t.) | £16 7s. 9d. (£1 6s. 0d. p.t.) | £56 14s. 6d. (£4 10s. 10d. p.t.) |
| 4. Ambassador II (23.2 tons) | £87,970 (£3,790 p.t.) | £42 4s. 3d. (£1 16s. 3d. p.t.) | £98 15s. 8d. (£4 5s. 0d. p.t.) |
| 5. Constellation IV (47 tons) | £168,350 (£3,580 p.t.) | £72 11s. 6d. (£1 11s. 0d. p.t.) | £200 14s. 0d. (£4 8s. 2d. p.t.) |
| 6. Orion I (89.3 tons)... | £332,421 (£3,740 p.t.) | £146 19s. 6d. (£1 12s. 9d. p.t.) | £387 9s. 7d. (£4 6s. 10d. p.t.) |
| 7. Brabazon I (134 tons) | £531,460 (£3,970 p.t.) | £198 5s. 0d. (£1 9s. 6d. p.t.) | £531 19s. 4d. (£3 19s. 4d. p.t.) |

**REPRESENTATIVE SCHEDULED OPERATING COSTS FOR CONTEMPORARY TYPES.**

| Time between landings | 3,000 hr. annual util. (plus 3 per cent dead flying) | Rapide III | Dove I | Dakota III | Ambassador II | Constellation IV | Orion I | Brabazon IB |
|---|---|---|---|---|---|---|---|---|
| 1 hr. ... | Total annual costs ... | £60,800 | £98,100 | £280,000 | — | — | — | — |
| | Total cost per hour ... | £20.25 | £32.70 | £93.30 | — | — | — | — |
| 2.5 hr. ... | Total annual costs... ... | £36,600 | £64,300 | £155,300 | £343,000 | £646,000 | £1,274,000 | £1,818,000 |
| | Total cost per hour ... | £12.20 | £21.43 | £51.77 | £114.33 | £215.33 | £424.66 | £606.00 |
| 4 hr. ... | Total annual costs... ... | — | £55,800 | £129,100 | £297,300 | £552,000 | £1,096,000 | £1,571,000 |
| | Total cost per hour ... | — | £18.60 | £43.03 | £99.10 | £184.00 | £365.33 | £523.66 |
| 6 hr. ... | Total annual costs ... | — | — | £114,600 | £272,000 | £501,000 | £996,000 | £1,432,000 |
| | Total cost per hour ... | — | — | £38.20 | £90.66 | £167.00 | £332.00 | £477.33 |
| 10 hr. ... | Total annual costs ... | — | — | — | — | £459,000 | £916,000 | £1,323,000 |
| | Total cost per hour ... | — | — | — | — | £153.00 | £305.33 | £441.00 |
| 12 hr. ... | Total annual costs ... | — | — | — | — | — | £896.000 | £1,295,000 |
| | Total cost per hour ... | — | — | — | — | — | £298.66 | £431.66 |

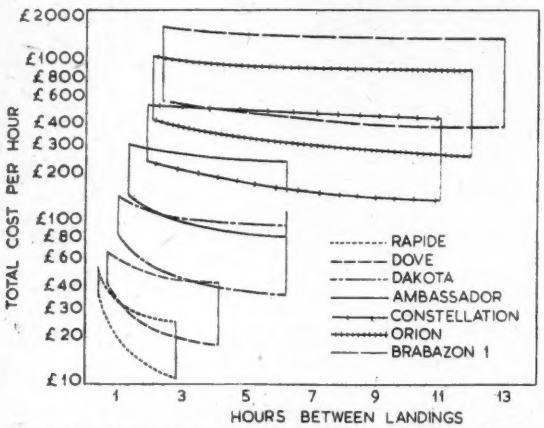
The costs must be considered in relation to the payload capacity and hence the revenue of the various aircraft and also to the block-to-block distance per hour.

## Some Economic Factors in Civil Aviation . . . . .

ing costs of a large aircraft tended to be less per ton of gross weight—80 per cent—than those of a small aircraft.

From typical economic U curves plotted for the various aircraft could be read the stage duration over which an aircraft could be flown economically at the lowest fares regardless of wind—a duration ranging from 2.1 hours for the Dove up to 12.1 hours for the Brabazon I.

Turning from the cost to the important matter of revenue and profit and loss account, Mr. Masefield said that revenue was directly proportional to stage length and load factor, and dependent on the type of traffic. Representative figures for present-day fares and charges could be broken down as shown




*Operating costs per hour versus hours between landings for various utilizations between 500 and 4,000 hours per year.*

in the table. Figures were founded on the rather high international mail rate of six gold francs per tonne-kilometre, and assumed a 10 per cent reduction in half the passenger fares at representative European rates for return tickets. For the seven aircraft, normally equipped, results indicated an average revenue of 5s 5d per ton-mile of combined payload for the large aircraft, to 6s per ton-mile of combined payload for the medium types, and 8s per ton-mile for the smaller types. Although hour charts read in conjunction with hour curves gave all the answers for any selected stage length and one condition, for quick appreciation Mr. Masefield plotted the operating costs and revenue of the seven aircraft related to stage length in still air. From 215 to 600 miles stage length the Ambassador was the most economic of the aircraft reviewed, and despite its higher cost was cheaper to operate than the Dakota for each ton of payload or for each passenger over all stage lengths. The higher the head wind the greater

**REPRESENTATIVE REVENUE FIGURES**

| Scheduled Operations for : | Long Stage Services | Medium Stage Services | Short Stage Services |
|---|---|---|---|
| Representative aircraft involved ... | Brabazon IB<br>Orion I<br>Constellation | Ambassador<br>Dakota | Dove<br>Rapide |
| Average weight of each passenger (with baggage, and consumable stores). | 250 lb (9 passengers per ton of payload) | 225 lb (10 passengers per ton of payload) | 200 lb (11.2 passengers per ton of payload) |
| Average European Passenger Fare per mile. | 6 pence (4s. 6d. per ton of passengers per mile) | 8 pence (6s. 8d. per ton of passengers per mile) | 8 pence (7s. 6d. per ton of passengers per mile) |
| Mail rate per ton mile | 16 shillings | 16 shillings | 16 shillings |
| Freight rate per ton mile. | 3s. 4d. | 5s. 0d. | 5s. 0d. |
| Combined average rate of revenue per ton mile (at 65 per cent passenger load factor). | £0.27 | £0.30 | £0.40 |

the Ambassador's advantage. For stage lengths between 600 and 2,350 still air miles the Constellation was the most economic proposition. The Brabazon I had the field on its own from 2,350 miles up to its maximum of 3,920 miles stage length. For scheduled operations in still air profits could be made on stage lengths approximately as follows:—

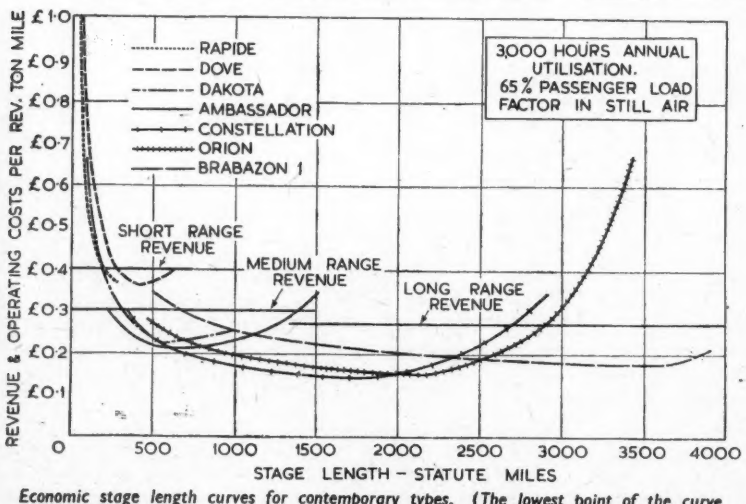
| | |
|---|---|
| Rapide | 190-290 miles |
| Dove | 270-650 miles |
| Dakota | 310-980 miles |
| Ambassador | 220-980 miles |
| Constellation | 335-2,700 miles |
| Brabazon I | 750-3,920 miles |

Against head winds both the amount of revenue and the economic stage length would be reduced. In the present state of the art, and taking into account average winds but not the amount of traffic offering, the most economic size of aircraft for a non-stop stage length of:—

100 miles is about 4,000 lb (two pass.)
500 miles is about 30,000 lb (24 pass.)
1,000 miles is about 85,000 lb (36 pass.)
2,000 miles is about 180,000 lb (56 pass.)
3,000 miles is about 280,000 lb (84 pass.)
3,500 miles is about 325,000 lb (112 pass.)

Relating these figures to the seven selected contemporary types of aircraft, the most economic stage lengths over which each could be operated were as follows:—

| Aircraft | Still Air and 60 m.p.h. Headwind | Block Speeds |
|---|---|---|
| Rapide ... ... | 290 to 144 statute miles | 103 to 51 m.p.h. |
| Dove ... ... | 444 ,, 288 ,, ,, | 148 ,, 96 ,, |
| Dakota ... ... | 600 ,, 390 ,, ,, | 145 ,, 95 ,, |
| Ambassador ... | 700 ,, 555 ,, ,, | 219 ,, 174 ,, |
| Constellation ... | 1,880 ,, 1,440 ,, ,, | 225 ,, 203 ,, |
| Orion I ... ... | 2,170 ,, 1,760 ,, ,, | 276 ,, 224 ,, |
| Brabazon I ... | 3,630 ,, 3,000 ,, ,, | 300 ,, 248 ,, |




*Economic stage length curves for contemporary types. (The lowest point of the curve indicates the stage length at which the most economic performance is achieved in still air.)*

If lowest cost per revenue ton-mile were plotted against stage length, assuming the use of the most suitable size of aircraft, it could be seen that the best stage length to fly for the lowest operating cost per ton-mile (but not necessarily the highest profit or least loss) lay between 1,800 and 2,000 stage miles in still air, using an aircraft of about 110,000 lb gross weight. Break-even fares could be reduced to about 3d per passenger-mile.

The most important conclusion which concerned operating costs and revenue was that, provided an aircraft was matched to a route in terms of the most economic size for the stage length to be operated, taking into consideration the prevailing winds, and provided that the aircraft was flown at a reasonable height, utilization of air transport, even with present types of commercially efficient aircraft, could be made to run at a profit at the present (high) fares. A prominent reason for the narrow boundary between profit and loss lay in the overheads and in the operation of stage lengths unsuited to the sizes of aircraft used.

Although weighted down with over-

heads and difficult operating standards, the Brabazon 1B showed itself capable of making a profit operating westbound across the North Atlantic against the average head wind which was 52 m.p.h. at 35,000ft. Eastbound with prevailing tail winds it should be better still. The Ambassador and the Constellation were also potentially profitable propositions.

In conclusion, the discussion in this section could be summed up as four essential requirements:—

(1) Reduce overheads.
(2) Increase utilization.
(3) Maintain standards.
(4) Match aircraft to routes.

### The Problem of Future Power Plants

Mr. Masefield said that one of the outstanding questions of the hour was the form of power plant which was likely to prove most satisfactory for various classes of transport aircraft. From the point of view of commercial operations, the questions which stood out in considering any new form of power plant were: What will it cost per annum? What are its powers of earning revenue? What are its qualities in bad weather? He then went on to examine three types of modern power plant applied to hypothetical airframes in comparison with a standard piston engine. They were the compound piston engine, the turboprop and the turbojet. Both short and long-range possibilities were analysed, and for the shorter stage types four twin transports, each of 28,000 lb gross weight, were considered.

(1) A twin Merlin transport, two 1,500 h.p. Merlin 35 engines. (T.M.T.)
(2) A twin Merlin helicopter with similar engines. (T.M.H.)
(3) A twin Dart transport with two 1,500 e.h.p. Dart turboprops. (T.D.T.)
(4) A twin Derwent transport with two 3,900 lb. static thrust Derwent turbojets. (T.J.T.)

The weights and performance characteristics of the four aircraft were tabulated as shown on this page. The assumed prime costs for complete power plants, excluding airscrews, which were representative but not precise makers' figures and tended to be on the high side, were:

Merlin—£7,000 (£4.7 per h.p.)
Dart—£12,600 (£8.4 per h.p.)
Derwent—£7,000 (£4.7 per h.p.)

The fuel, load and range of the helicopter had been deliberately restricted to ensure maximum performance over the short stages for which it was most suited. Taken all round, the weights and performances showed up the turbine types remarkably well. On examining the twin Derwent transport with the same standards for allowance and fuel reserves as had to be assumed for the other two twin transports, it was found that at present standards the amount of fuel required for taxy, climb, descent, diversion and stand-off would occupy more than the tankage provided, a minimum payload of 3,000 lb having been specified and the gross weight having been fixed by take-off requirements. In other words the aircraft was completely inflexible and its economic possibilities were made ridiculous by the fuel consumption on diversion and stand-off.

**WEIGHT ANALYSIS TWIN-ENGINED SHORT-RANGE AIRCRAFT**

| Weights in lb | Twin Merlin Transport (two standard piston engines) | Twin Merlin Helicopter (two standard piston engines) | Twin Dart Transport (two turboprops) | Twin Derwent Transport (two turbojets) |
|---|---|---|---|---|
| Structure | 8,300 | 9,615 | 8,450 | 8,500 |
| Power plant and systems | 6,200 | 6,270 | 3,900 | 4,100 |
| Operating equipment | 2,350 | 2,350 | 2,350 | 2,350 |
| Passenger equipment | 1,750* | 2,000† | 2,000‡ | 2,000‡ |
| Empty | 18,600 | 20,235 | 16,700 | 17,050 |
| Basic (with crew, fixtures) | 19,850 | 21,485 | 18,030 | 18,530 |
| Maximum oil capacity | 350 | 240 | 60 | 50 |
| Equipped | 20,200 | 21,725 | 18,090 | 18,580 |
| Maximum usable fuel capacity | 4,870 | 3,315 | 7,000 | 6,550 |
| Corresponding payload | 3,000 | 3,000 | 3,000 | 3,000 |
| Usable fuel with capacity payload | 0 | 0 | 2,130 | 1,680 |
| Capacity payload | 7,870 | 6,315 | 7,870 | 7,870 |
| Disposable load | 7,870 | 6,315 | 10,000 | 9,550 |
| Gross | 28,070 | 28,040 | 28,090 | 28,130 |
| Pre-flight fuel allowances | 70 | 40 | 90 | 130 |
| Maximum take-off and landing | 28,000 | 28,000 | 28,000 | 28,000 |

* Non-pressurized. † Bus-type seating for additional passengers. ‡ Pressurized.

**COMPARATIVE PERFORMANCE DATA TWIN-ENGINED SHORT-RANGE AIRCRAFT**

| | Units | Twin Merlin Transport (two standard piston engines) | Twin Merlin Helicopter (two standard piston engines) | Twin Dart Transport (two turboprops) | Twin Derwent Transport (two turbojets) |
|---|---|---|---|---|---|
| 1. Total take-off power | e.h.p. | 3,000 | 3,000 | 3,000 | (7,800 lb) 3,000 |
| 2. Meto power | e.h.p. | 2,480 | 2,480 | 2,730 | variable |
| 3. Cruising power assumed | e.h.p. | 1,340 | 1,340 | 1,340 | variable |
| 4. Meto power for cruise | per cent | 54 | 54 | 49.2 | variable |
| 5. Operating height at start of cruise regime | feet | 10,000 | 2,000 | 17,000 | 30,400 |
| 6. Operating height at end of cruise regime | feet | 10,000 | 2,000 | 26,000 | 40,200 |
| 7. Assumed av. cruising fuel consumption | lb/hr | 615 | 615 | 880 | 2,490 |
| 8. Assumed specific cruising fuel consumption | lb/ e.h.p./ hr | 0.458 | 0.458 | 0.655 | 1.335 |
| 9. Cruising speed at take-off weight | m.p.h. | 212 | 110 | 264 | 343 |
| 10. Cruising speed at 85 per cent take-off weight | m.p.h. | 220 | 112 | 270 | 350 |
| 11. Cruising speed at 70 per cent take-off weight | m.p.h. | 227 | 114 | 227 | 355 |
| 12. Cruising consumption at 85 per cent take-off weight | lb/mile | 2.80 | 5.50 | 3.26 | 7.1 |
| 13. Air miles per gallon | a.m.p.g. | 2.57 | 1.29 | 2.48 | 1.14 |
| 14. Theoretical still-air range at operating height, no allowances | statute miles | 1,740 | 603 | 2,140 | 922 |
| 15. Estimated take-off distance to 50 feet on full power at max. take-off weight | feet | 2,000 | Nil | 2,000 | 2,000 |

The only hope for such a machine would lie in improved air traffic control.

Round figures of interest for the fuel consumptions of transport aircraft standing off at 5,000 ft. at 180 m.p.h. were:—

Piston-engine types: 1½ per cent of landing wt. per hr.
Turboprop types: 2½ per cent of landing wt. per hr.
Turbojet types: 6½ per cent of landing wt. per hr.

In order to continue with his comparison, Mr. Masefield therefore assumed in the case of the turbojet transport an improvement in air traffic control, and by the use of automatic landing procedures (1) no diversion to an alternate airport to be contemplated, (2) 30 minutes stand-off at operating height to be an adequate emergency reserve.

Following a detailed analysis of the four types a cost summary was prepared as follows:—

| | T.M.T. | T.M.H. | T.D.T. | T.J.T. |
|---|---|---|---|---|
| Fixed Annual Costs, £ | 44,735 | 46,745 | 50,245 | 44,485 |
| Hourly Cruising Costs, £ | 23.35 | 25.28 | 23.92 | 33.50 |
| Take-off and Landing Costs, £ | 57.02 | 31.37 | 58.37 | 47.78 |

For a production run of 150 aircraft, the cost per pound of gross weight for the four types was respectively £2.5, £3.0, £3.01, £2.5.

For a utilization for 3,000 hours with two hours between landings, the operating costs for the four types would be:—

| | T.M.T. | T.M.H. | T.D.T. | T.J.T. |
|---|---|---|---|---|
| Per annum, £ | 200,255 | 164,745 | 209,445 | 223,200 |
| Per hour, £ | 66.8 | 54.9 | 69.8 | 74.5 |
| Per still-air stage mile, £ | 0.406 | 0.560 | 0.346 | 0.268 |
| Block speed (still air) m.p.h., £ | 164 | 98 | 202 | 278 |

With a 3 per cent addition for dead flying the results were plotted as comparative U curves for operating costs per revenue ton per hour.

The general conclusions which could be drawn from the survey of shorter range aircraft were:—

*First*, because of its high consumptions at low speeds and heights, the plain jet aircraft could not be a commercial proposition in the present stateof air traffic control—except

(*Continued on page* 470)

# THE HOPPI-COPTER

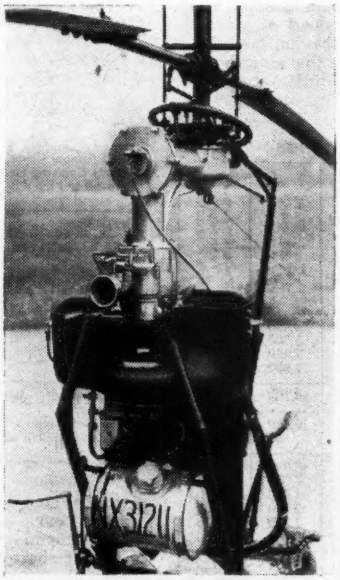
## *The Smallest Man-carrying Helicopter in the World : Empty Weight Less than 200 lbs*

*The Hoppi-Copter all but airborne. Note the "hanging stick" control. On the right, Mr. H. T. Pentecost, the designer, waiting to have the engine started.*

AN interesting and welcome visitor to this country is returning to America on Saturday after a few weeks' stay, but he is leaving behind a piece of intriguing mechanism—in fact two—with which British helicopter enthusiasts will have a great deal of fun. The visitor is Mr. Horace T. Pentecost, president of Hoppi-Copters, Inc., of Boeing Field, Seattle, Washington, and he brought over to this country two of his Hoppi-Copters, type 102. Present plans are that one will go to the Research, Development and Training Unit for Rotary Wing Aircraft at Beaulieu, where the O.C., S/L. F. J. Cable, will teach himself to fly it and then make exhaustive tests of its characteristics. Negotiations are also proceeding with a view to forming an English company for the development and manufacture of the Hoppi-Copter.

Mr. Pentecost first conceived the idea of a very small helicopter during the war, and in fact produced a version strapped to the back of the pilot, whose legs were the "undercarriage." The intention was that the contraption should be used for getting individual troops to inaccessible places. The idea was not adopted, but Mr. Pentecost was to some extent rewarded by being awarded the second prize at the World Inventors' Exposition in Los Angeles.

With the coming of peace, Mr. Pentecost realized that something a little more substantial was needed, and after much development work and burning of the midnight oil he has evolved the present model, the Hoppi-Copter 102, which is just about the simplest man-lifting flying machine ever built. Three undercarriage legs, an engine, transmission, superimposed two-bladed contra-rotating rotors, a seat, and a control stick describes the outfit; or nearly so; there is also a rotor revolution counter, a throttle and a small clutch lever.



*Rear view, showing the two-cylinder engine, petrol tank, transmission and gimbal-ring control mechanism.*

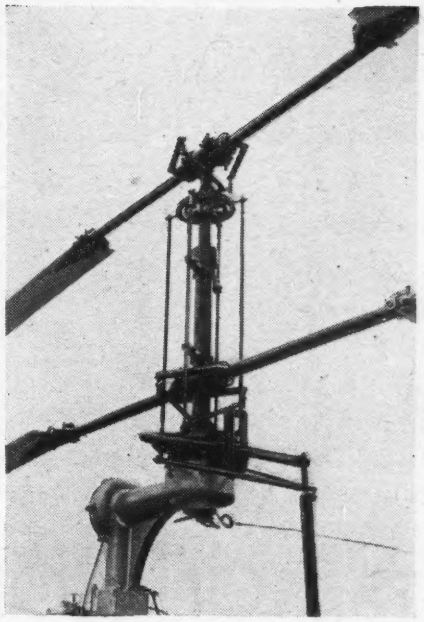
It might be argued that there is not much more than that in any helicopter. True, these are bare essentials, but it is in simplifying every one of them that Mr. Pentecost has shown his ingenuity, and he has reduced the flight controls to one: a single "hanging" stick. Movement of the stick in any direction causes the machine to travel in that direction by applying cyclic pitch in the appropriate sector of the rotor disc. Collective pitch increase and decrease is applied to both rotors by raising or lowering the control stick bodily, and directional control by twisting the stick handle. This action applies more or less pitch to the upper rotor only, thus leaving a small unbalanced torque which causes the machine to turn in one direction or the other.

The whole control mechanism is remarkably simple: gimbal rings linked by tubular rods to the pitch cranks of the rotor blades. It is, of course, our old friend the wobble plate reduced to its lightest form. Doing away with a separate collective pitch-control lever has not only avoided the need for that awkward "pat-your-head-and-rub-your-chest" control co-ordination which is so very far from being instinctive, but it has saved both weight and complication. The twist-grip on the stick is geared to a cam ring on the lower control gimbal so that rotation of the grip rotates the ring, and the sloping cam slots cause it to rise or fall, according to the direction of rotation, thus increasing or decreasing the pitch of both blades of the top rotor simultaneously by sliding the upper gimbal ring up and down the rotor shaft.

Simplification, largely made possible by the small size, low weight and small forces involved, has also been intro-

duced in the rotors themselves. The inner portion is in the form of tubes attached to the rotor shafts via thrust bearings. At their outer ends they carry the flapping hinges, which are set at a small delta angle. There are no drag hinges, and the wood blades, of solid spruce, are secured to the flapping hinges by plates bolted through the blade roots. The rotor diameter is 16ft, and the blades are of symmetrical section (N.A.C.A. 0012) with a chord of 5in. Flapping of the blades in an upward direction is restricted by small adjustable stops.

The backbone of the Hoppi-Copter is formed by the tubular framework and the transmission-shaft casing. It will be seen from the photographs that two right angles occur in the transmission in order to bring the rotor shafts, and centre of lift, forward to a position above the pilot's head. This means two sets of bevel gears and a very strong casing, but it is difficult to see how the result could be achieved for any less weight. Incidentally, the gear ratio between engine and rotors is 10:1. As the engine runs at from 4,500 to 5,000 r.p.m. the rotor speed is 450 to 500 r.p.m.



*The rotors are carried on the transmission-shaft casing, and control is by the single stick. Rotation of the stick gives directional control, an up-and-down movement alters pitch collectively, while a tilt of the stick gives cyclic pitch control.*

In the present Hoppi-Copter the engine is a horizontally opposed two-cylinder two-stroke air-cooled, made up by Mr. Pentecost from various components, as he could not obtain an engine really suitable for the machine. It develops about 35 h.p., which appears to be sufficient for hovering in the ground cushion, but might be increased with advantage if the machine is to be used for serious work. At present the machine is mainly a test bed for proving the rotor system. Some of the parts used are from an outboard motor as used in boats, and starting is by a length of rope to which has been added two lengths of bunjie so that two men can stand well outside the rotor disc for starting up. Cooling is by a flywheel fan which blows the air up past the baffle-plated cylinders. A petrol tank of about 2½ gallons capacity is mounted below the engine.

### Demonstrating the Hoppi-Copter

General Aircraft housed the Hoppi-Copters and saw to the assembling. Mr. Pentecost did not bring over a pilot, and is not a pilot himself, but he did give *Flight* a demonstration on the compass base at Hanworth. More correctly, above the compass base, for the machine was airborne several times, with its three diminutive wheels clear of the concrete. Starting the engine was a bit tricky, as is the way of two-strokes. But once the mixture was right it ran with a very healthy roar (it is unsilenced) and seemed to give plenty of power. The clutch started the rotors very gently and without jerk, and a tentative lift showed that the very faint breeze was crabbing the machine over the ground. A slight turn of the twist-grip brought it head to wind, and the Hoppi-Copter rotated slowly and drifted gently to and fro, always well within the bounds of the compass base.

No reference has been made above to a very necessary part of the equipment. This is a small crutch in which the pilot's right forearm rests. That gives him a datum and acts at the same time as a steadier; without it there would be some difficulty in obtaining the necessary delicacy of control. Even with it, it appears to us from watching Mr. Pentecost, that the machine is extremely sensitive. Actually that might have been expected from first principles. The control rests solely on a nice balance between the various forces on the two rotors, and the machine is so light that a very slight inclination of the control stick immediately causes translational flight in some direction. But there can be no doubt that the system works in exactly the way it is intended to work.

Hitherto we have referred to hovering flight only, and that in the ground cushion. Mr. Pentecost informed us that pilots have actually had the Hoppi-Copter up to some 20 ft or so, but that they have not flown it at any very considerable translational speed, nor has it ever been taken up high enough for autorotation tests to be made. That the rotors will perform this function there is no valid cause for doubting, as the configuration is orthodox. The empty weight of the machine is 195 lb, and with pilot and a couple of gallons of fuel the loaded weight is probably some 375 lb, which would correspond to a disc loading of one pound per sq ft, or less, for the two discs. The two rotors are well separated vertically, so there should not be much interference.

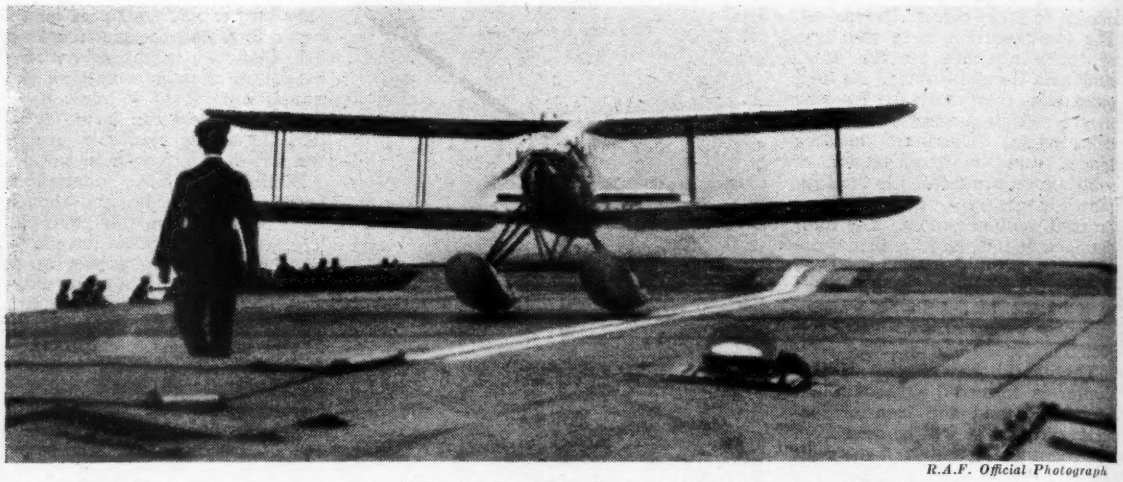
Rather more doubtful is the problem of translational flight at any considerable speed. It seems likely that the machine may be unstable directionally, in which case it might be necessary to add a vertical tail surface. That would add a few pounds to the weight, but in any case a slightly more powerful engine would be an advantage to enable cruising to be done at less than full power.

In fact, a really suitable engine appears to be the great need of the Hoppi-Copter as it stands. Mr. Pentecost was unable to find one in America, but he has hopes that a British engine may be forthcoming when the new company is formed. However, that is a future consideration, and will depend upon the support given to this very interesting little machine. Possibly the R.A.F. will have little use for it, but it is not difficult to imagine useful applications in connection with the Army and, possibly, the Navy. Should the War Office appreciate its possibilities, so that fairly substantial orders could be placed, no doubt a suitable engine would be produced, and production costs could become very low indeed, especially if the engine were a simple two-stroke. Basically there is nothing expensive in the machine itself, and with a cheap engine the whole outfit could be sold at a remarkably low price.

## TOWED HELICOPTERS

A NOVEL application of helicopters to rescue work is to be tried by the U.S. Air Force. When a fixed-wing aircraft has crashed in some inaccessible place, too far from the nearest usable piece of ground within helicopter range, the idea is to tow the helicopter from a suitably situated airfield by a fixed-wing aircraft. The helicopter will rise under its own power until the tow-rope is taut, when the aircraft will take off and gain altitude. The helicopter pilot will gradually reduce power and ultimately put his rotor into autorotative pitch, with his engine stopped or idling. When over the scene of the accident, he will start his engine, change into power-driven flight and cast off the tow rope. He will then alight by the wreck and give first-aid, etc.

Returning to base with survivors, or for further supplies, it is visualised as a possibility that contact with the tug can be made in flight, the helicopter letting down its tow line, which is caught by a trailing line from the tug. For the first tests it is intended to use a Piasecki tandem-rotor helicopter and a Fairchild C-119, but the scheme could, presumably, be used with other helicopters and other aircraft, although possibly the tandem rotor arrangement of the Piasecki HRP-1 may lend itself especially well to the operation.



R.A.F. Official Photograph

*Some remarkable deck trials were made in 1927 with two Fairey floatplanes. This picture shows a III.F landing on the deck of H.M.S. Furious.*

# STORY of an OLD, OLD STORY

## *A Modern Theme Recalls Some Early Deck Trials*

By B. J. HURREN

THE lull which has followed the storm of World War II gives us breathing space for reflection, time to review progress and reveal that which has long been hidden by the veil of official secrecy.

How great that secrecy has been is not often realized. Even to-day, for example, no official performance figures have yet been released of the Fairey III.F, whilst such an aircraft as the Fulmar, a purely war-years' aircraft, exists as no more than a name, a photograph and a lone aircraft (first to be built and officially the last to remain flying).

Not the least interesting of aeronautical secrets which one is now able to uncover concern those of long-ago naval aviation. They are the more interesting because of a progress report on this especial subject made in U.S.A. some time ago by Rear Admiral Stevens, U.S. Navy, who puts over some telling points.

The Admiral spotlights a delicate subject when referring to jet aircraft. He agrees that the technical problems of aircraft carrier operations have, to a large degree, been solved with conventional aircraft, but he states categorically that the same does not apply to jet aircraft.

He refers to the likelihood that "jet blast may eventually make it impossible to taxi an aircraft out of a crowded spot position" and goes on to sketch the problems connected with run-up testing, the employment of blast deflectors, and the possibility of highly mechanized deck equipment involving conveyers.

Other points made include the fact that range is the one factor of naval aircraft which has not shown the same degree of progress as speed, altitude, and so on. "It is customary to point out," he says, somewhat sardonically, "that nuclear propulsion will solve the range problem for ever," and then proceeds to cold-water the idea of any near-future solution in this regard.

Insisting that the field of anti-submarine warfare is, perhaps, the one which offers the greatest reward for imaginative thinking by engineers—a theme with which most people on this side of the Atlantic will agree—he comes to the conclusion that vertical take-off and landing of high-performance, manned aircraft is the one towards which present trends are moving.

Without calling further on the Admiral's extremely lucid recognition of an exceedingly involved problem, one may, now that the ban on secrecy is lifted by kind co-operation and permission of the Air Ministry, recount here some details of a series of experimental flights which were successfully completed two decades ago, and concerning which information has not so far been generally available.

(For it is written, and wise men will profit by the words, that: "*The thing that hath been, it is that which shall be; and that which is done is that which shall be done; and there is no new thing under the sun.*" It is an old theme that many revolutionary ideas which eventually become accepted are more often than not initially pigeonholed for the dust of Time to impart that recognition which newness fails to accord the pioneer and inventor.)

Just over twenty years ago, in July, 1927, a series of trials was completed successfully from the deck of H.M.S. *Furious*. These trials involved a Fairey III.F and a Fairey Flycatcher in both landplane and seaplane versions of each type.

The Flycatcher seaplane was tested for launching from a gun turret platform, in a series of take-offs with an average relative wind of 27.3 knots. The best run made was in a 27-knots wind, when the run took 91 feet. However, the tests were considered unsuccessful in that the requirement was for a 47-foot run in a 28-knot wind.

In World War II, though not actually launched from a gun turret, we did see the Hawker Hurricane used from camships; and, in this con-

***OPERATION** of jet-propelled aircraft from the decks of carriers presents many problems. These are now engaging the attention of British and American Naval Authorities. Hitherto the aircraft designer has had to shoulder the burden. The author suggests that the time has come for the ship designer to contribute his share.*

*More than twenty years ago, tests were made with Flycatchers and III.Fs fitted with floats. With jet-propulsion there is no need for a tall undercarriage as there is no airscrew ; hence there is a moral in this tale.*

*R.A.F. Official Photograph*

*A Fairey Flycatcher landing on Furious on July 22nd, 1927. The floats were not quite strong enough for such deliberate abuse, and some buckling occurred, but take-off and landing runs were quite short.*

## Story of an Old, Old Story . . . . .

nection, we have yet to hear authoritatively the story of the lone Hurricane from a camship which routed a flock of eight German torpedo bombers on a P.Q. convoy to North Russia.

Next Flycatcher trial concerned the landings on the deck by the seaplane version. To make this quite clear, the landings and take-offs were on floats which had been strengthened on the underside. Initially, three take-offs and landings were made ; the longest landing run was 214 feet and the shortest 170 feet. The best take-off run was 91 feet, and the worst 112 feet.

It is clear that this was well inside the deck space of the *Furious*.

Similar trials were made with the Fairey III.F. Duralumin "V"-type floats were fitted, and after the landings it was found that both floats were slightly crushed at the bulkhead of the rear step, the slower the landing the more the tendency to buckle. Once again, with landing runs of a maximum of 198 feet in a 26-knot relative wind, the deck of *Furious* could easily accept this aircraft.

The significance of these trials, of which only brief details have here been given, is the more apparent when the size, weight and complexity of the modern warplane undercarriage is considered. These weights, presented as a percentage of the all-up weight of the aircraft, appear as a considerable fraction of the whole ; and, naturally, as the aircraft of tomorrow grow larger, the problem of the alighting gear comes even more sharply into the picture.

The ingenious devices by which our undercarriage and wheel designers have mastered war-time problems are acknowledged in full ; but it must be recognized that numbers of new aircraft, civil and military, and not all in the "heavy" class, have had to double the wheels, and a few types have already standardized on a four-wheel formula. Furthermore, the Messerschmitt "Gigant" incorporated a whole battery of wheels, whilst the Arado 232 mustered no fewer than 24 wheels in all!

At the other end of the scale, the Messerschmitt 163 was designed to alight on a skid undercarriage. The landing of this is cited as being a magnificent spectacle but guaranteed to give even the best Flying Officer Kites acute twitch after a few landings, since the touch-down was at around 185 m.p.h. and the landing run about 650 yards on a grass airfield. We did it long ago, and much better, on the deck.

In parallel with this, observers have noted with interest the comparatively small undercarriage equipment as seen in, for example, the Vampire and Meteor.

Thus, the thing which emerges clearly is that the ingenuity of the aircraft designers has been extended to the full, and that ship design has lamentably failed to keep pace with the progress of the aircraft. Indeed, although British aquatic aviation goes back to 1909 when the first crude seaplane appeared at Wivenhoe, it was not until the 1938 *Ark Royal* that a warship appeared basically designed as an aircraft carrier—although the *Eagle* had a muddled, modified and converted hybrid birth two decades before.

From this, the obvious conclusion is that a cold and searching wind is needed to invigorate the ideas in the ship constructors' offices ; and that the burden of solving the operational problems not only of aircraft with pilots on board but of robot flying machines, which ought to be at least in part recoverable as opposed to 100 per cent loss at the end of a flight as at present, should be shared with the ship designers and constructors.

As to this, to quote not inappositely from Ecclesiastes again, *"The words of the wise are as goads, and as nails fastened by the masters of assemblies."*

### HOSPITAL TO REOPEN

HER MAJESTY QUEEN MARY has graciously consented to open King Edward VII Hospital for Officers (Sister Agnes, Founder) at Beaumont House, Beaumont Street, London, W.1, on October 15th, 1948. The hospital has two wards of five beds and two of two beds, where nursing and maintenance will be free. There are also seventeen single rooms, for which the charge will be much less than it would be elsewhere in London. Patients make their own arrangements with their physicians and surgeons. Regular and retired officers of the Royal Navy, the Army and the R.A.F. are eligible for admission; also all temporary officers of all three Services who fought in the 1914-18 or 1939-45 wars, provided they become subscribers. The annual subscription is £1. Applications should be made to the House Governor, Beaumont House, Beaumont Street, W.1.

Sister Agnes founded this hospital in her own home, 17, Grosvenor Crescent, in 1899. Between then and 1941, over ten thousand officers were patients. Badly damaged by bombs, the hospital had to be closed. Sister Agnes died and bequeathed £30,000 to the hospital.

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# GLOSTER AIRCRAFT, BENTHAM

THAT the Gloster Aircraft Co., Ltd., has a very efficient technical staff has been obvious to the world for a long time. That this same staff also counts among its members men of high ability when it comes to entertainment was shown at the sixth annual dinner (the second since the war) of G.A.C., Bentham, held at the Queen's Hotel, Cheltenham, last Friday. The performers were all members of the staff, a fact difficult to surmise from the quality of the "turns."

On the more serious side, Mr. R. W. Walker, chief designer, recalled that at last year's dinner it looked as if there might have to be a contraction of the firm's activities. That had not proved to be the case, and the Meteor and its variants were still going strong. A new 600 m.p.h. plus fighter had made successful flights, and that was not the end.

Mr. P. G. Crabbe confirmed that the Meteor would be in production for many years. Competition would grow, but Glosters would keep their place in front. They were confident of the success of future types.

Mr. W. G. Carter thanked his design team for their hard work in the past and asked for just that little bit more which was so important in view of the short time available.

Mr. R. H. Bound, deputizing for Mr. Dowty who was unable to be present, recalled that Mr. Dowty was an old Gloster man, and that the collaboration between the two firms was of long standing. He was confident it would continue.

Lt. Col. Donnet, chief of the Belgian Air Force, who had come over with a team to collect their first Meteor, expressed his pleasure in being able to continue in this way the association which began many years ago with the Gladiator biplane fighter.

Mr. Hugh Burroughes, pointing out that the pace was getting hotter, competition keener, and the numbers in the drawing office greater, said that the problems associated with the design and production of new types were getting more complex, and it was necessary to look ahead. They had therefore decided to make Mr. W. G. Carter a sort of "high priest" (technical director) so that he could be thinking ahead and not be worried by day-to-day problems. His place as chief designer had been taken by Mr. R. W. Walker. That was in conformity with the practice of the group; Mr. Chadwick had been followed by Mr. Davies and recently Mr. Lloyd by Mr. Watson. That was the group's way of ensuring that they kept on top.

Mr. Eric Greenwood paid tribute to the test team; it was the best Glosters ever had. He recommended the technical people to keep in close touch with the test pilots; they would find them very helpful.

## SWEDISH VAMPIRES NOT GROUNDED

IN an article describing Sweden's air defences contained in *Flight* of July 22nd, 1948, attention was drawn to the very satisfactory record of Vampires in service with the Swedish Air Force At that time, of the 70 supplied under an original contract, 69 were still airworthy. Since then more Vampires have been delivered and there have been two fatal accidents each due to a quite different cause. One unfortunately involved one of Sweden's foremost Service pilots, Colonel Naeslund.

Following the most recent accident, the daily Press reported that the Swedish Air Force had grounded all D.H. Vampires pending investigations. We are glad to say that this was not true, and the following official statement from the Swedish Air Ministry was issued on October 7th:—

"It has been stated in the British Press that all Swedish Vampires have been grounded following an accident. This is untrue. The pilot reported by radio after he had taken off that the rear bearing of the jet engine was registering a higher temperature than it should, and that he intended to make a forced landing. He lost speed in a turn during the approach and crashed. The engine was running at the time but not at full speed. The aircraft was one of three which had been in the store for one year and this was its first flight after storage. The Swedish Air Force have grounded the other two aircraft to see whether the storage affected the rear bearings of the engine, for instance, by corrosion." The Swedish Air Ministry adds that it has full confidence in the Vampire aircraft and its Goblin engine and has no reason to restrict flying in any way whatever.

Protests made by the United States about the supply of British de Havilland Vampires to Sweden have been withdrawn as a result of the British reply. The three points stressed in this reply were the importance of aircraft exports to Britain's economic recovery, that the Swedish Vampire contract would not interfere with the projected supply of British fighters to Western Union countries, and that in any case Sweden and other Scandinavian countries might eventually be incorporated into the Western European Regional Defence Pact.

## SOME ECONOMIC FACTORS IN CIVIL AVIATION

(*Continued from page 465*)

perhaps in a few good weather areas of low traffic density.

*Second*, the plain jet aircraft to be effective in present conditions would have to be built much bigger than an equivalent propeller type, in order to stow the extra fuel required for a particular stage. The result would be more weight, more power to maintain take-off requirements and hence higher costs and less economy.

*Third*, given improved air traffic control all types of aircraft will become cheaper to operate but the greatest benefit will be enjoyed by the jet. Once the diversion and "stack up" problem is eliminated the plain jet, by virtue of its speed, can become almost as cheap to operate as propeller-powered aircraft at much higher speeds, although somewhat restricted in range.

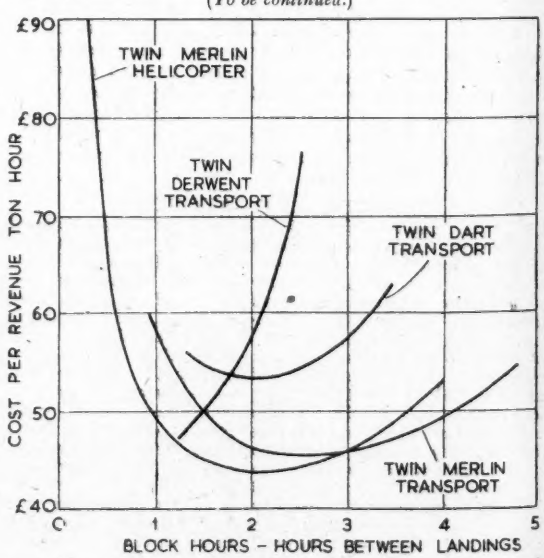
*Fourth*, in the meantime the propeller turbine offers advantages of speed over the orthodox engine at approximately the same cost per revenue mile, although for a slightly narrower band of effective ranges, being limited in economy over very short stages or over the longer stages of which the piston engine is capable.

*Fifth*, in general, the propeller-turbine powered aircraft will have to be somewhat bigger than the piston powered aircraft to achieve the same flexibility of performance. Granted a larger aircraft, then the propeller turbine can be at least as economic, at higher speed.

*Sixth*, the helicopter is more expensive to operate per revenue ton mile than any equivalent fixed wing aircraft and because of its low speed will be much more influenced by surface winds. Nevertheless the helicopter is the only possible form of air transport for short inter-city stages. For short stages higher rates may be contemplated to make the helicopter a commercial proposition.

One thing stands out above all others. It is that the plain jet aircraft offers immense economic possibilities for the moderate ranges surveyed. At present they must remain only as possibilities because the jet is strangled at birth by limitations imposed by air traffic control.

(*To be continued.*)




*Related "U" curves of hourly operating cost per revenue ton of payload*

# CORRESPONDENCE

*The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.*

## BROUGH

### *Why is the F.T.S. Closed ?*

HAVING read about new Reserve recruiting drives, more branches and centres of the V.R. open for volunteers, and of women being admitted to the V.R., I was astonished when visiting East Yorkshire recently to find the Brough E.F.T.S. closed down. The air which for more than ten years has resounded to the "roar" of B2s and Tigers was almost silent. The reason for this closing down, now of all times, I cannot imagine. Brough has good permanent buildings and hangarage, and a great deal has been spent on extensions and improvements to the airfield since early war days. The area is quite good for flying, although admittedly there is a fair amount of morning mist at certain times of the year. Up the river there is a very convenient relief and forced landing field.

It may be that the flying training school was closed down at the request of the Blackburn company who own it, but this I find hard to believe. The testing of Prentices now made at Brough, and of one or two Firecrests, could hardly constitute a hazard to flying instruction on the airfield, or vice-versa.

No. 4 E.F.T.S., of which I have very happy memories, is one of the oldest and soundest of the original E. and R.F.T.Ss. I understand from one of two of the local V.R.-ists to whom I talked, that there are plenty of volunteer pilots in the locality to support a Reserve centre, and more in the "pipeline" (whatever that may be) even before the latest intensified drive.

There will be very many pilots, in and ex-uniform, who remember their "sprog" days at Brough, and will join me in hoping that No. 4 will soon be reopened and making its contribution to the band of young pilots which we again need so badly.

SMITH, NO. 4.

Radlett, Herts.

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## AIR ACCIDENT INVESTIGATION

### *Altimeter Settings, Control Services and Communications*

THE letter from the Deputy Master of the Guild of Air Pilots and Air Navigators in your issue of September 16th, criticizing the report on the accident to a Viking aircraft at Northolt on January 6th, will earn him the gratitude of all "B" licence pilots. There are few people who have the ability to view these things without bias, and to present their conclusions with precision and clarity. As a personal friend of the captain involved in this accident, the imputations of the report rankled with me, and I could not be sure that I had not read into the report either more or less than was actually there. Thanks to Mr. Cumming's letter I see now that I missed the significance of certain points.

I would like to add a few general remarks on the subject of why captains make these so-called "Errors of Judgment." An error of judgment only appears as such when the information on which an action is taken is identical with the information which afterwards appears to have been available. If one or more items of information assumed to be available to the pilot (or the control officer) were in actual fact not available, then the case to be judged is different, and the judgment may have been perfectly logical.

Let us take the altimeter setting as a case in point. The pilot assumed that (a) he had been passed the latest QFE, and (b) that he had set it correctly. Assumption (a) was wrong, but he had no means of knowing it. Assumption (b) may or may not have been wrong; there is no proof that he set it one millibar high. Assuming that he did set it wrongly, the altimeter then read approximately 30 feet of excess height. This setting of altimeters accurately is a thing which is practically impossible to do under adverse conditions, because when you are strapped back in your seat your altimeter setting knob may be only just within reach at full stretch of your arm. In addition, the position of it on the panel may involve a parallax error of one millibar or more. Then again, turbulence and the distance of it from your eye may make accurate setting of the fine divisions of the sub-scale impossible, especially in a poorly lit cockpit.

Next we read that the zero setting of the altimeter was "within limits." This means it may have been a further sixty feet out, so that the altimeter may have been showing a height which was up to 90 feet in excess of the true height above airport level. This means that cloud height, reported to the captain as 400 feet, found by him to be 150 feet, may have been as low as 60 feet at the time he thought it was 150 feet. His mental reaction would be that "they" don't seem to have much of a clue as to the vital factor of cloudbase height. In addition, the altimeter is reported as having a leak 60 per cent outside the limits, which presumably nobody knew anything about. These errors alone could make the difference between hitting and missing a tree-top, and would appear to most people to be sufficient to admit that the pilot could be free from blame.

Let me now proceed to some generalizations on factors affecting the correctness of any particular judgment of a situation. What about the pilot's confidence in the controller? It is a fact that some control officers appear to pilots to be "clots," just as no doubt some pilots appear to control officers to be "clots." There is justification for these viewpoints being held. Admittedly there is more panicking in foreign control offices than there is in the United Kingdom. A pilot feeling lack of confidence in the control service will, in an emergency, make a different decision from that he will make if he is confident in the control. This has often been done, but it is only called an "Error of Judgment" in the event of an accident happening.

The Control Service itself, unfortunately, has often encouraged this "no confidence" state of mind by its inefficiency. This has been shown more lately in the case of Northolt by the collision between a York and a D.C.6, in which it became known that the control officers apparently thought that 500 feet separation between aircraft was safe. I was appalled when I read that, and thanked the Lord that the same had not happened to me. Any particular aircraft had only to be 250 feet out of its height to be in danger of collision with the next one above or below, and it is very easy to be that much out by reason of (a) incorrect altimeter setting; (b) faulty altimeter not yet found out; (c) temporary inattention while fiddling with knobs and switches in an effort to obtain better reception of either Control R/T or navigational or landing aid; (d) turbulence in cloud; or (e) a combination of any or all of these. No sir! If they reckon 500 feet is enough, I quit flying in I.F.R.

I think probably the most frequent failure of the Control Service is in the extremely vital matter of communication. H.F. R/T is very often useless, owing to its short range and atmospheric background noises. V.H.F. is good provided it is working well, but often in aircraft sets reception is so distorted that interpretation is difficult. The control officers have more efficient sets than the pilots have. Power is greater, and clarity of reception and transmission is better. The set in the aircraft is often working under adverse conditions. Often water that has leaked through the joints in the cockpit drips on to the set or its remote controls, or into the headset jack sockets, producing a nose which I do not know how to transcribe on to paper, but which is far removed from intelligible human speech. Control officers make this worse by gabbling off their instructions at high speed. Foreigners have the greatest difficulty here, and if they would speak more slowly to all, their instructions would be less misunderstood, and safety improved. On many aircraft sets one gets the impression that the controller is sitting there at his desk eating hot chestnuts!

To return to the subject of Accident Investigation, the other week in Malta I met an Accident Investigation Officer on his way to North Africa to investigate the loss of an aircraft lost eleven months previously. This shows the organization wants pepping up more than somewhat. The M.C.A. costs us a lot of money—no wonder! Another Investigating Officer was heard to approach the wreckage of an aircraft with words to the effect that this time we cannot blame the pilot. Normally, of course, they do.

J. C. NEILAN.

Sutton, Surrey.

### FORTHCOMING EVENTS

Oct. 15th.—Second International Air Ball at London Airport.
Oct. 15th.—Institute of Navigation: "Transverse Navigation, an Alternative to the Grid System," W. A. W. Fox.
Oct. 16th.—Wolverhampton Aero Club: The Siddeley Trophy Race.
Oct. 21st.—Royal Aeronautical Society: "Cold Weather Operation of Aircraft," G. W. Wilson, A.F.R.Ae.S. and S/L E. P. Bridgland, R.C.A.F., B.Sc., A.F.R.Ae.S.
Oct. 22nd.—Bristol and Wessex Aeroplane Club: Aviation Ball, Grand Spa Hotel, Bristol.

# SERVICE AVIATION

## *Royal Air Force and Naval Aviation News and Announcements*

### *No. 615 in the News*

THE County of Surrey squadron of the R.Aux.A.F. had a busy time last week. On Tuesday the squadron's Honorary Air Commodore, The Rt. Hon. Winston S. Churchill, O.M., C.H., M.P., R.Aux.A.F., opened the new town headquarters at 10, Tavistock Road, Croydon, and on the following Friday the Lord Lieutenant of Surrey, Sir Malcolm Fraser, Bt., G.B.E., performed the naming ceremony at Guildford of the Battle of Britain class railway engine named after the unit.

Mr. Churchill, accompanied by his daughter Mrs. Mary Soames, was in R.Aux.A.F. uniform and wore the pilot's wings awarded him by the Air Council in April, 1943, in recognition, as it was said at the time, of his piloting the country through its difficulties. He was received by S/L. R. G. Kellett, D.S.O., D.F.C., who commands No. 615.

Addressing the assembled members of the squadron, and a crowd of some three thousand outside the new H.Q., Mr. Churchill pleaded with his listeners, when considering the new recruiting campaign, to put country before party, and, above all, the cause of freedom over tyranny.

Recalling what had happened in Surrey and Kent during the late war he remarked upon the likelihood of an intensive attack by rockets and pilotless aircraft from across the Rhine in any future conflict. He also used for the first time the significant phrase, "The frontier of Asia is upon the Elbe." This, of course, in a single sentence infers a complete re-orientation of world strategy.

At Guildford, Sir Malcolm Fraser, before unveiling the No. 615 (County of Surrey) Squadron plaque on the Battle of Britain class engine, gave a brief account of the squadron's war history and finished with these words: "May I take this opportunity to appeal to all air-minded young men in Surrey to join this gallant band of brothers whose past record is enshrined in the County."

"Flight" photograph.

GENERAL SALUTE: Hon. A. Cdre. Winston Churchill and his daughter at the opening of No. 615 Squadron H.Q. S/L. Kellett is on the extreme left next to F/L. Howes.

### *Western Air Commander*

THE important task of co-ordinating the air defence of Britain, France, the Netherlands, Belgium, and Luxembourg has been allotted to Air Marshal Sir James Robb, K.B.E., C.B., D.S.O., D.F.C., A.F.C., the Vice-Chief of Air Staff. As Commander-in-Chief Air Forces, Western Europe, he is directly responsible to Field Marshal Viscount Montgomery, the Military Chairman of the Land, Air and Naval Command Committee.

Air Marshal Sir James Robb was appointed Vice-Chief of Air Staff in October last year, before which he spent over two years as A.O.C. Fighter Command.

Air Marshal Sir James Robb in his personal Meteor 4.

"Flight" photograph.

RAILWAY HONOUR: Sir Malcolm Fraser unveiling No. 615 Squadron's crest on the Battle of Britain class railway engine at Guildford.

### *Stalag Luft III Trust Fund*

A SUM of nearly £11,000 has been paid to dependants of the 50 officers who were captured and shot by the Germans after the mass escape from Stalag Luft III in March, 1944, when 76 officers of the R.A.F. and Dominion or Allied Air Forces escaped from the northern compound. The officers remaining in the compound formed the Stalag Luft III Trust Fund to assist dependants of the shot prisoners, and through auction sales and personal subscriptions they raised £11,011 8s 6d. With the exception of £267 due to the widow of F/O. J. Mondshein, of the Polish Air Force, who cannot be traced, this sum has now been dispersed and the Trust Fund is now being wound up. The sum due to Mme. Mond-

## Service Aviation . . . . .

shein has been transferred to the Stalag Luft III Communal Fund, which is administered by the trustees of the R.A.F. Benevolent Fund, in the hope that she may eventually be traced.

### *Duty Travel Subsidy for Forces*

MANY members of the R.A.F. obliged to live in private accommodation more than two miles from their place of duty now have to pay only 2s 6d weekly for one return journey on each working day. Similar schemes apply to the Army and Navy; for Service women the qualifying distance is one and a half miles. When the return journey exceeds 30 miles, 2s 6d and the cost of travelling in excess of this distance must be paid. Those who receive London allowances are ineligible for this scheme, as travelling expenses are already taken into account in their allowance. A mileage allowance is payable to Service men and women using their own vehicles.

### *Appointment*

AIR COMMODORE V. S. EWING has been appointed Principal Medical Officer of Fighter Command. A. Cdre. Ewing, who was commissioned in the R.A.F. Medical Branch in 1922, has been P.M.O. of Transport Command since July, 1947.

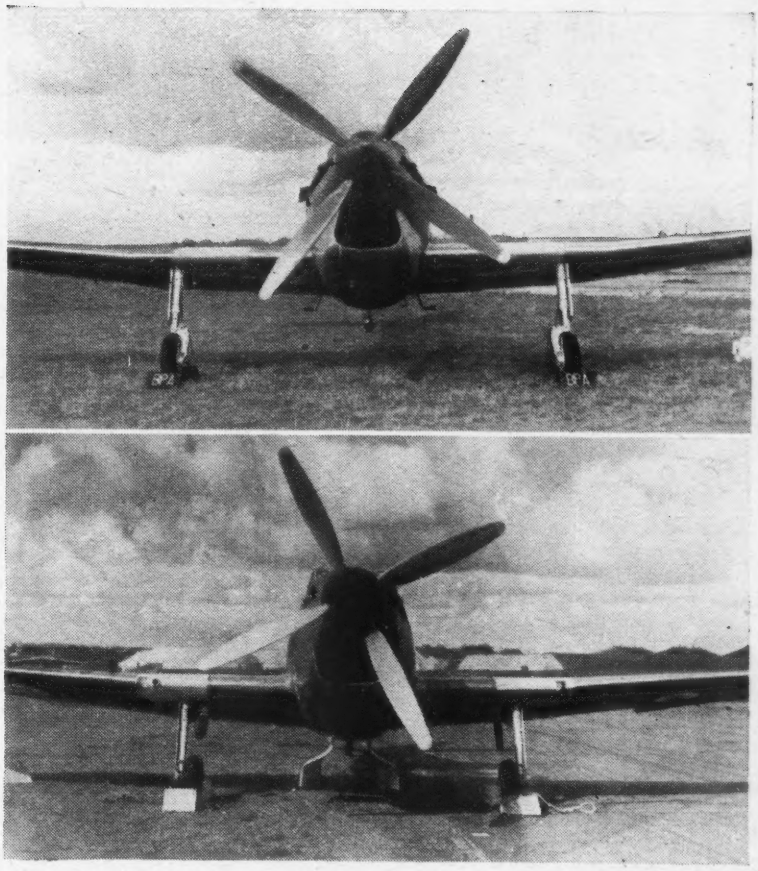
### *Air Ministry Organization*

THE Air Ministry announces that the Secretary of State has appointed a Committee "to review the organization of the Air Ministry in the light of present-day requirements and to recommend what improvements are possible in the interests of efficiency and economy in manpower and money." The members of the Committee are: Mr. A. J. Quig (Imperial Chemical Industries) (Chairman); Marshal of the Royal Air Force Lord Douglas of Kirtleside, G.C.B., M.C., D.F.C.; Mr. E. P. Harries (Trades Union Congress); Mr. F. H. Sandford, C.M.G. (Deputy Under Secretary, Air Ministry); and Mr. J. R. Simpson, C.B. (Treasury, Organization and Methods).

### *V.R. Navigators and Signallers Begin Training*

THE air training of ex-service navigators and signallers at R.A.F. Reserve Centres began on Sat., Oct. 1st, in accordance with plans to increase recruiting and training given in the R.A.F.V.R. At No. 5 Reserve Centre, Cambridge, S/L. Worsdell, D.F.C., the chief flying instructor of 22 Reserve Flying School, also at Cambridge, piloted an Anson on the first training flight, carrying two navigators and two signallers.

It is planned to give 40 hours' refresher training to V.R. navigators and signallers, including ten hours' night flying, keeping reservists well practised on the latest radio navigational aids, morse operating, flight planning, and air plotting. Training trips planned at Cambridge include Cambridge to Belfast and return, and a triangular route to Hull, Birmingham, and back to Cambridge. Former navigators or signallers below the age of 38 interested should contact the C.O., No. 5 Reserve Centre, The Aerodrome, Newmarket Road, Cambridge, for further details.



***SUBTLE DISTINCTION:** The impression on first sight of these comparative views is that there are no external differences between the Boulton Paul Balliol T.2 (top) and the Avro Athena T.2 when seen in frontal aspect. Although both have the Merlin 35 engine (1,280 b.h.p.) which is largely responsible for the remarkable similarity, closer study shows varying design trends, notably in fuselage sections, contours of the air intakes, and undercarriages.*

### *R.F.C. Reunion*

A PROPOSAL has been made to hold a reunion dinner in London this winter of all who served in the Royal Flying Corps, Naval and Military Wings. This will include those who served in the R.F.C. Military Wing from its formation in April, 1912, until it was merged into the R.A.F. in April, 1918, and those who served in the Naval Wing from its initiation in April, 1912, until the formation of the R.N.A.S. in July, 1914. If numbers permit, it is hoped also to include those who served in the R.N.A.S. from July, 1914, to the formation of the R.A.F.

Former R.F.C. types who will be prepared to help by serving on an organizing committee and doing some work in the organization and others who would support such a reunion dinner are asked to write to Geoffrey Dorman, Sponson Developments, Ltd., 3, Albemarle Street, London, W.1.

### *Aircrews for the Navy*

TO-MORROW (Friday, October 15th) is the closing day for applications to enter the Navy as a cadet pilot or observer under the new Naval aircrew scheme, further details of which have been announced by the Admiralty. The age limits will be 17 years 8 months to 20 years. Candidates will be entered as Naval Cadets, be promoted to Midshipmen after six months and to Sub-Lieutenant after about two years' total training. Promotion to Lieutenant will follow, the period depending on results obtained in courses. Candidates will not be required to pass a written examination but must be in possession of a School Leaving Certificate or its equivalent, with credits in mathematics and science. They will serve eight years on the Active List, followed by seven years on the Emergency List. Some will have opportunities of transferring to permanent commissions.

Full details can be had from the Secretary of the Admiralty (C.W. Branch 521), Queen Anne's Mansions, London, S.W.1.

### *Auxiliary Appointments*

SQN. LDR. F. O. COPELAND has been appointed Commanding Officer of No. 2504 (County of Nottingham) Light A.A. Squadron of the R.Aux.A.F. Regiment. The Squadron has Bofors guns for its main armament and is stationed at R.A.F. Hucknall, as is No. 504 Auxiliary Flying Squadron, to which it is affiliated.

* * *

South Yorkshire's No. 2616 Light A.A. Squadron, R.Aux.A.F. Regiment, is also equipped with Bofors, and will com-

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bine with 616 (S. Yorks) Auxiliary Squadron for exercises. S/L. S. E. W. Norris is to command No. 2616 Squadron.

### For Second Thoughts

BOYS accepted as R.A.F. Apprentices or Boy Entrants may now return home from the Selection Centre before being enlisted to consult their parents about the trades offered to them. As boys are not always suitable for the trades for which they apply, and are offered alternatives, it is better that they should make their decisions in their own homes.

### "A.C.H." is Out

THE trade of aircraft hand for general duties is to be abolished in the R.A.F., as the Air Council considers that the system by which personnel in this category were employed in various occupations, without belonging to any particular trade or section, did not foster sufficient interest or satisfaction in their work. Five new trades are to be introduced, so that the variety of duties formerly allotted to aircraft hands will be divided among the administrative orderly, messing orderly, flight orderly, technical orderly, and general duties trades. The last-named trade is for flight sergeants or warrant officers engaged on disciplinary and supervisory duties.

### A Good Show

NO accidents involving death or injury occurred during air line or trooping flights by R.A.F. transport aircraft in the month of August. The total of passenger miles flown was 3,916,900.

### R.C.A.F. Appointment

ON October 1st Air Vice-Marshal R. C. Dunlap, C.B.E., R.C.A.F., took up his new appointment as Air Member for Air Plans, replacing A.V-M. A. L. Morfee, C.B., C.B.E., who is retiring. A.V-M. Dunlap, who joined the R.C.A.F. in 1928, has been attached to the Air Force H.Q. since last August, when he returned from special duties in the U.S.A. In 1946 he acted as the official R.C.A.F. observer at the Bikini atomic bomb tests.

*Air Vice-Marshal R. C. Dunlap R.C.A.F.*

### W.A.A.F. Officers Appointed

THE passing-out parade of the first post-war W.A.A.F. Officer Cadet Training Unit took place at Hawkinge on Sept. 21st. Successful candidates received their letters of appointment from the Director of the W.A.A.F., Air Commandant F. H. Hanbury, M.B.E., and the best cadet, now S/O D. Jenkins, was awarded a certificate of merit.

### Permanent Commissions

*GENERAL DUTIES BRANCH*

*Wing Commanders:* F. Aikens, A.F.C., L. V. E. Atkinson, D.S.O., D.F.C., A. Montague-Smith, G. R. Nottage, D.S.O., A.F.C.

***ALL ABOVE BOARD : Three air mechanics on the flight-deck of H.M. Carrier Theseus, during the recent Fleet exercises, empty fuel from a Firefly's drop-tank, while a fourth squats on a chock and adjusts what appear to be fuel transfer pipe-lines.***

*Squadron Leaders:* M. C. Adderley, A.F.C., R. Findlater, D.S.O., D.F.C., C. K. Gray, D.F.C., G. R. S. Mckay, D.F.C., A. J. Moody, H. J. Rayner, D.F.C., A.F.C., T. Stevenson, A.F.C.

*Flight Lieutenants:* N. G. Alderdice, D.F.C., R. O. Blackall, W. R. Brooks, D.F.C., H. G. Cullen, D.F.C., H. G. Davies, M. R. Davison, D.F.C., D. A. Dobbie, A.F.C., W. G. Fell, M.B.E., D. A. Hammatt, D.F.M., H. D. Johnson, D.F.C., D. S. Leete, R. T. Llewellyn, D.F.M., G. K. N. Lloyd, G. J. Lynes, T. C. McNamara, D.F.C., C. Newberry, S. H. Redmond, W. D. Robertson, H. Shaw, D.F.C., R. C. Shuster, D. A. Sudul, P. G. West, D.S.O.

*Flying Officers:* R. H. D. Dulieu, J. A. G. Slessor.

*TECHNICAL BRANCH*

*Wing Commander:* A. Hodgson.

*Squadron Leaders:* L. Ballard, W. J. Burdett, C. H. Lang, R. Wilson.

*Flight Lieutenants:* F. R. Boalch, E. J. Booker, M.M., A. Contaris, A.F.C., H. Drake, K. C. B. Field, F. Gibbs, P. J. Kitchen, W. A. Lamb, H. P. Langworthy, L. S. Martin, S. C. Matthews, V. Murray, A. B. Peaker, T. H. Pitcairn-Hill, G. Stirland.

*Flying Officers:* D. H. Barnard, W. B. Miller, V. G. Piercey.

*Pilot Officer:* N. J. Gardner.

*SECRETARIAL BRANCH*

*Squadron Leaders:* G. Broadhurst, G. W. Dawson, D.F.M., H. R. Evans, R. R. P. Fisher, G. A. Gamble, D.F.M., W. P. Hopkin, D.F.C., P. Kirk, D.F.M., C. H. Leese, G. Tate, D.F.C., E. T. Thompson, J. Wishart.

*Flight Lieutenants:* A. G. Baker, T. F. Bayliss, G. G. Beaugeard, A. L. Bryant, C. E. Bulport, H. W. Crocker, J. C. Evans, S. Ewing, V. B. Farningham, W. J. Fry, D.F.C., J. Hobbs, K. J. W. Josling, M. H. T. Molloy, A. Murdock, E. H. O'Toole, A. E. Pelly, F. Reeve, J. K. Roberts, J. G. Sharratt, T. N. Staples, P. C. Warren, R. B. Weller.

*Flying Officer:* G. Alexander.

*Pilot Officers:* A. J. M. Farquharson, J. J. Miller.

*EQUIPMENT BRANCH*

*Squadron Leaders:* C. S. Reade, A. C. Straker, W. E. G. Vaughan.

*Flight Lieutenants:* C. H. P. Bell, D.F.C., J. E. Dew-Parry, J. E. Dickerson, M. Driscoll, J. Griffiths, G. B. Latimer, V. L. Kaye, J. L. Lumsden, A. F. McCarthy, M.B.E., J. W. Murchie.

*Flying Officer:* J. C. G. Wilson.

*Pilot Officer:* R. A. Bain.

*MEDICAL BRANCH*

*Squadron Leader:* F. S. Krusin, B.D.S., M.R.C.S., L.R.C.P.

*R.A.F. REGIMENT*

*Squadron Leader:* H. S. Gibbs.
*Flight Lieutenant:* H. E. Hunt.

*PROVOST BRANCH*

*Wing Commander:* J. S. Mason.
*Pilot Officer:* A. Smart, B.E.M.

*PHYSICAL FITNESS BRANCH*

*Flight Lieutenant:* E. L. Horsfall.

### Reunions

THE Second Reunion of No. 125 Squadron and No. 6125 Echelon will be held on Saturday, Dec. 18th, 1948. Ex-members wishing to attend should contact J. P. Cole, River Plate House, 13, South Place, London, E.C.2.

* * *

The Second Annual Dinner of the R.A.F. Netherlands East Indies Officers' Dinner Club will be held in London on Friday, Dec. 3rd, 1948. Information and tickets can be obtained from S/L. B. G. F. Drinkwater, Air Ministry, Room 201A, Bush House (S.E.), Strand, W.C.2.

* * *

The Second Annual Dinner of the R.A.F. Regiment Officers Dinner Club will be held at the Café Royal, Regent Street, to-morrow, Friday, Oct. 15th at 6.30 p.m. for 7 p.m. Admission by ticket only; tickets, one guinea, from L. S. Symonds, 63, Woodgrange Avenue, Kenton, Middlesex.

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The first reunion of W.A.A.F. officers who served in the war and those who are still serving will be held at the Hyde Park Hotel on Nov. 26th in the form of a cocktail party, organized by a committee of ex-W.A.A.F. officers. Air Commandant Hanbury, Director of the W.A.A.F., will be present. The Hon. Secretary is Miss O. A. Davies, 45, Basilton Court, Devonshire Street, London, W.1.